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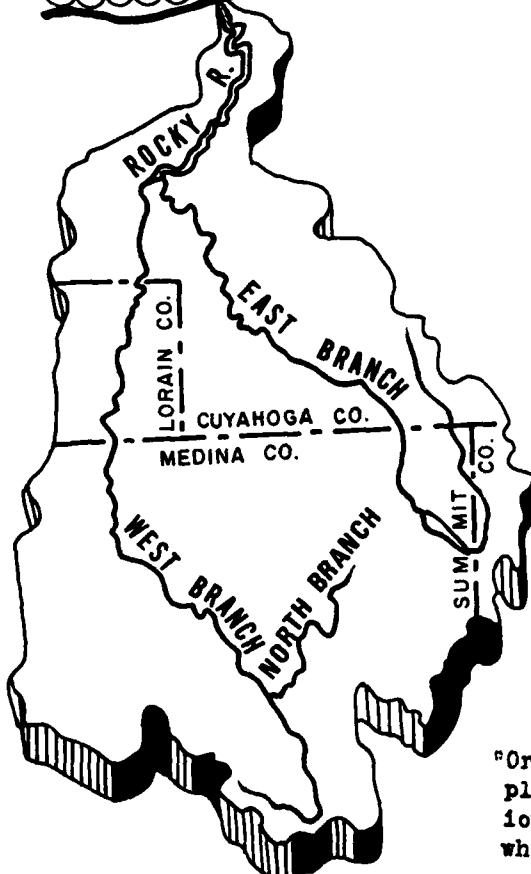
FLOOD PLAIN INFORMATION

WEST AND NORTH BRANCHES
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MEDINA COUNTY

OHIO

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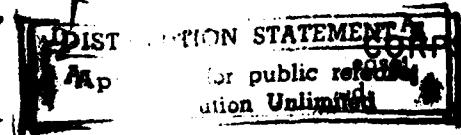
OHIO DEPARTMENT OF NATURAL RESOURCES
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AND

TRI-COUNTY REGIONAL PLANNING COMMISSION

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OCTOBER 1971



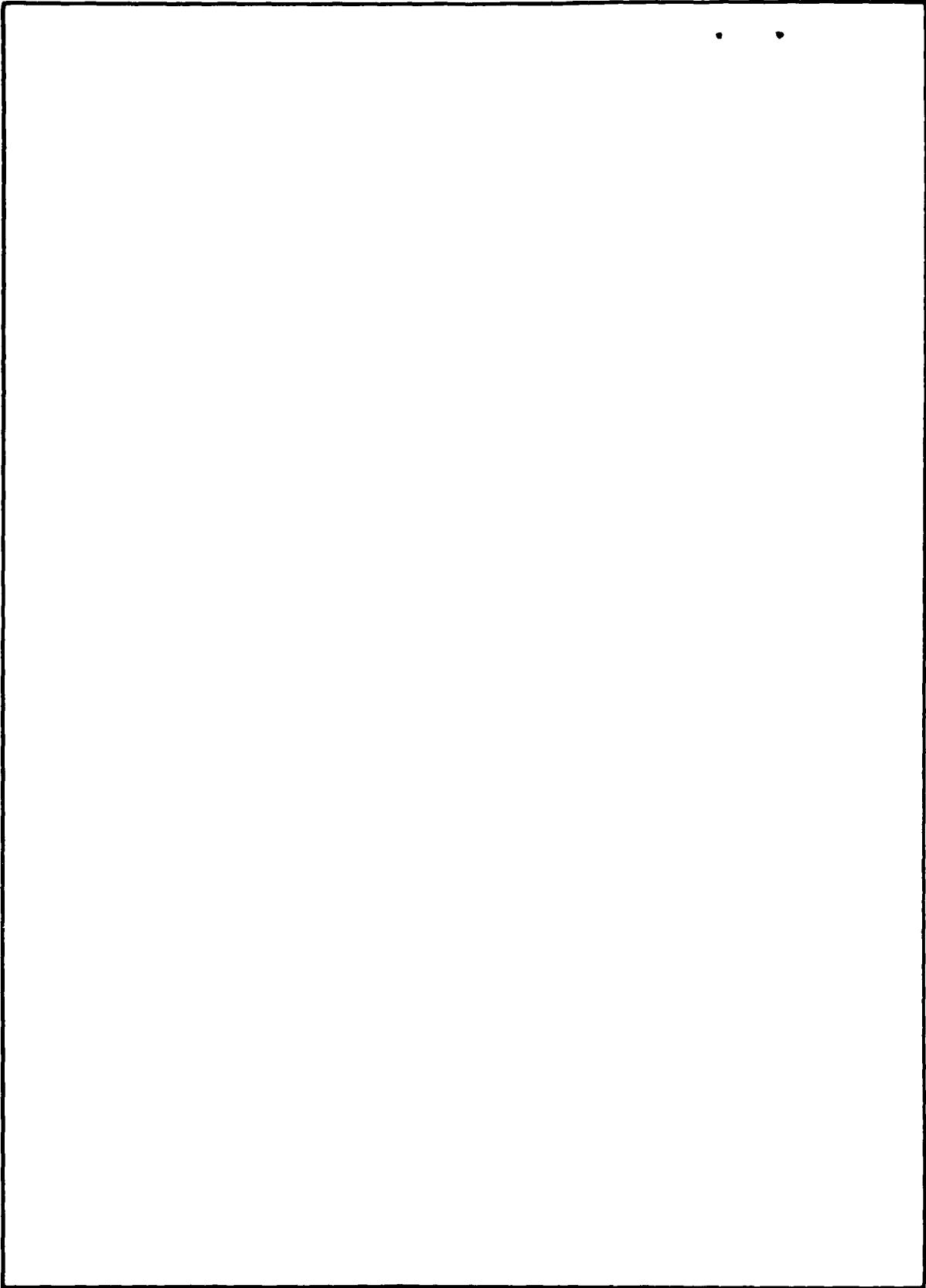
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INTRODUCTION

This flood plain information report on Rocky River, Medina County, Ohio, has been prepared at the request of the Tri-County Regional Planning Commission through the Ohio Department of Natural Resources. The Ohio Department of Natural Resources will make the results of the study available to local interests or individuals who have use for such information.

This study covers approximately 20.7 miles of the Rocky River including 15.1 miles of the West Branch and 5.6 miles of the North Branch. This report should be used as a guide by planners and local officials toward passage of effective legislation to control land use in the flood plain. Information on the largest known past floods and possible future floods, namely - the Intermediate Regional and Standard Projects Floods, are presented herein. In this report the flood plain refers to the area which would be inundated by the Standard Project Flood. The Intermediate Regional Flood has a frequency of occurrence in the order of once in 100 years, which means that over a long period of time, say 500 years, the magnitude of this flood would probably be equalled or exceeded about five times. In other words, each year there is a one percent chance that a discharge of at least Intermediate Regional Flood magnitude will occur. The Standard Project Flood is a flood of rare occurrence and on most streams in this area is larger than any floods that have occurred. It is suggested that when planning future development within the flood plain that the Standard Project and Intermediate Regional Floods be considered.

Included in this report are maps, profiles, photographs, and cross sections which indicate the extent of flooding which might occur in the future. Proper utilization of these data can minimize flood damage to future development within the study area. Those structures which are most susceptible to water damage should be elevated above flood levels or protected by flood proofing.

This report does not include plans for the solution of flood problems, nor is it intended to extend any Federal authority over zoning or other regulatory methods. Rather, it is intended to provide the basis for future study and planning on the part of local governments within the study area in arriving at solutions to minimize possible future flood damages. Local planning programs should guide development by controlling the type of use of the flood plain through zoning, building codes, and other appropriate methods. Flood plain control can also be accomplished through public acquisition of land for low damage use such as parks, picnic areas or green belts.

Pamphlets and guides pertaining to flood plain regulations, flood proofing and other related actions have been prepared by the Corps of Engineers. They are made available for the use of State agencies, local governments, and citizens interested in planning and taking action to reduce their flood damage potential.

The Buffalo District of the Corps of Engineers will, upon request, provide technical assistance to Federal, State, and local agencies in the interpretation and use of the information contained in this report and will provide other available flood related data. Data available include samples of flood plain regulations, high water marks, and benchmark descriptions. Requests should be coordinated through the Ohio Department of Natural Resources, Division of Water, 815 Ohio Departments Building, 65 South Front Street, Columbus, Ohio 43215.

SUMMARY OF FLOOD SITUATION

This flood plain information study covers the areas along the West Branch and North Branch of the Rocky River within the boundary of Medina County, a distance of 20.7 miles. Within the study area the stream flows through the communities of Weymouth, Abbeyville, Valley City, and Hardscrabble. The study area is shown on plate I.

A water-stage recording station is operated by the U. S. Geological Survey just downstream of the confluence of the East and West Branches, three miles northwest of the city of Berea. Recorded river stages resulting from the runoff of 267 square miles upstream of this station are available from October 1923 to September 1935 and from September 1943 to the present.

To supplement data from existing gage records, local officials and property owners along the stream were interviewed, and newspaper files and historical documents were searched for additional information concerning past floods. The following paragraphs summarize the significant findings which are discussed in more detail in succeeding sections of this report.

HISTORICAL FLOOD - During March 1913 and on 20 June 1924 severe flooding occurred. If the water rose another foot in March 1913 the old water works plant on Granger Road would have been flooded.

The 1924 flood, resulting from a tornado, made it necessary to evacuate residents from Valley City.

THE GREATEST FLOOD - The greatest flood known to have occurred within this study area in recent years was on 22 January 1959. Its peak flow of 21,400 cfs at the Berea gage is estimated to have a frequency of occurrence of once in 70 years.

OTHER GREAT FLOODS - The following dates have been recorded in newspaper articles and Corps of Engineers files as additional

occurrences of high water in the study area within recent years: 7 August 1935, 3 June 1947, 27 January 1952, and 10 February 1959.

INTERMEDIATE REGIONAL FLOOD - The Intermediate Regional Flood has an average frequency of occurrence in the order of once in 100 years. Plates 8 through 10 and table I indicate the depth of flooding that can be expected from a flood of this magnitude.

STANDARD PROJECT FLOOD - The Standard Project Flood is produced by the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the drainage basin under study. The elevation obtained from a flood of this magnitude is considered by the Corps of Engineers to be the upper limit of the flood plain.

FLOOD DAMAGES - In recent years many of the bridges within the study area have been replaced by bridges with larger waterway openings. This has appreciably decreased the potential future flood damages. However, damages would still result from the occurrence of the Intermediate Regional and the Standard Project Floods.

MAIN FLOOD SEASON - Ice jamming and melting snow are the major contributors to flooding. Although this in no way means that high stages could not occur at other times of the year, as evidenced by the 29 June 1924, 7 August 1935, and 4 July 1969 floods. However, the majority of flooding does occur in late winter or early spring.

FLOOD DAMAGE PREVENTION MEASURES - There are no existing or authorized flood control projects within the study area. Most of the flooding has been caused by ice jams upstream of constricting bridges. Many of these bridges are gradually being replaced with bridges having larger openings that are less likely to cause ice jams.

POSSIBLE FLOOD HEIGHTS - Flood levels that would be reached by the Intermediate Regional and Standard Project Floods are shown on table I. The water surface profiles for the Intermediate

Regional Flood and the Standard Project Flood are shown on plates 8 through 10.

VELOCITIES OF WATER - During an Intermediate Regional or Standard Project Flood, velocities would vary from one to 12 feet per second. Velocities greater than three feet per second combined with depths of three feet or greater are generally considered hazardous and dangerous to life and property.

HAZARDOUS CONDITIONS - Floods can cause hazards to local residents in many ways. Since most floods occur in the late winter and/or early spring, residents can suffer illness and discomfort from lack of heat if basement flooding extinguishes furnace fires. The duration and extent of flooding can develop health problems if septic tanks are inundated and if high water backs up sewer lines into basements. During floods municipal sewage treatment plants are often taxed beyond their capacities resulting in untreated discharge into floodways with consequent deposition of waste materials on stream banks and surrounding grounds. Flood waters which overtop roads can cause hazardous driving conditions. The danger from underestimating the velocity and depth of flood waters by unsuspecting children is an age old problem confronting residents within flood prone areas.

TABLE I
RELATIVE FLOOD HEIGHTS

Location	Mouth:	Flood	Estimated : (cfs)	Above : Top of Discharge: Bank (feet)
U.S. G.S. Gage near Berea (14.0 miles downstream of study area)	: 12.4	Intermediate Regional	22,900	-
	: Standard Project		71,200	-
Grafton Road	: 28.02	Intermediate Regional	13,600	4
	: Standard Project		42,400	10
Upstream of Mallet Creek	: 32.50	Intermediate Regional	9,600	5
	: Standard Project		31,000	8
Fenn Road	: 38.92	Intermediate Regional	9,600	7
	: Standard Project		31,000	15
North Branch upstream of West Branch confluence	: 41.46	Intermediate Regional	5,200	8
	: Standard Project		16,800	15
Nichols Road	: 45.87	Intermediate Regional	5,200	8
	: Standard Project		16,800	13

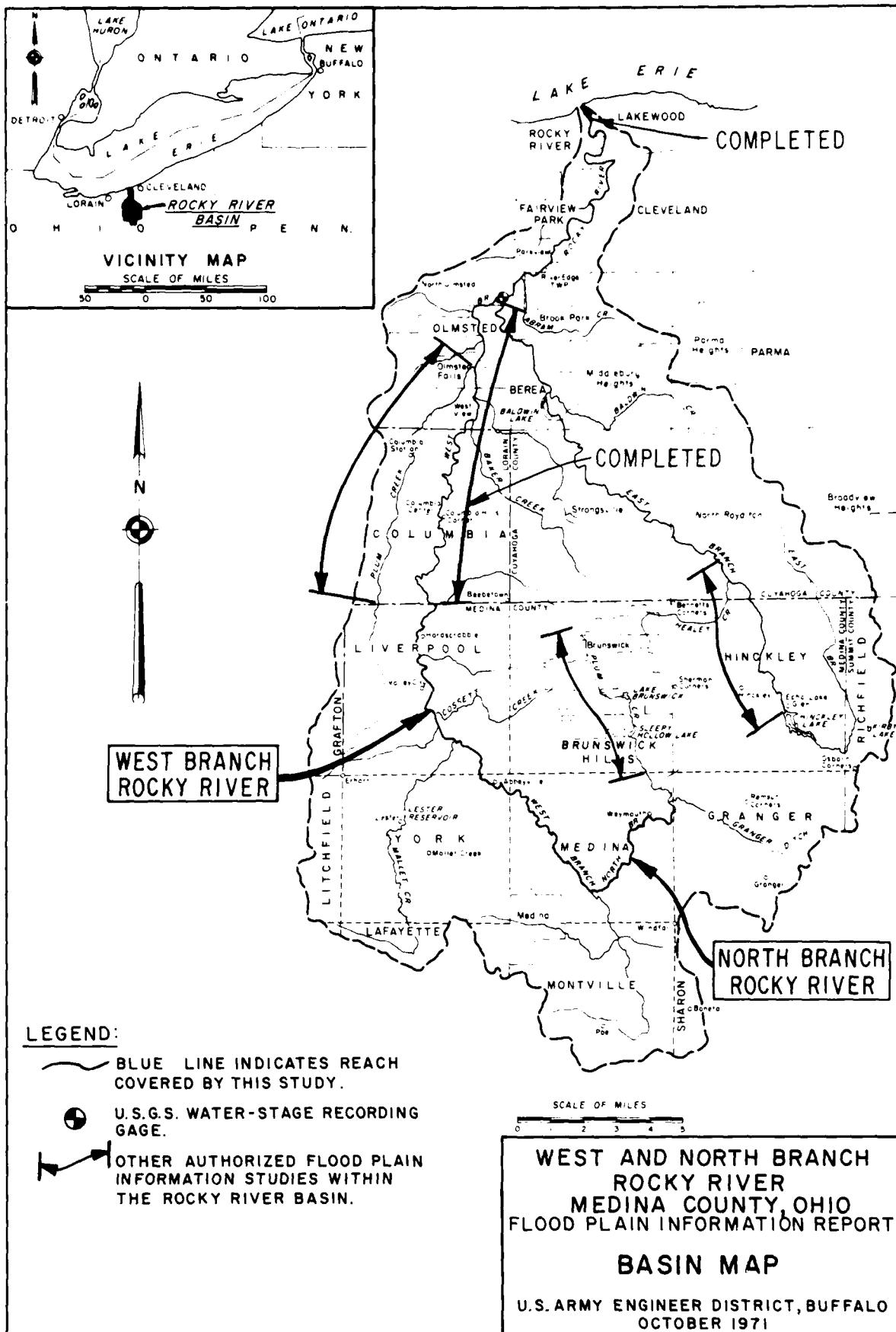


PLATE 1

GENERAL CONDITIONS AND PAST FLOODS

GENERAL

This section of the report gives a history of floods on the West and North Branches of the Rocky River within Medina County. The study area extends upstream along the West Branch from the Lorain-Medina County line, at stream mile 26.4, to the confluence of the North Branch and up the North Branch to Remsen Road at stream mile 47.1. Plate 1 shows the geographical orientation of the Rocky River basin and plates 4 through 7 show the approximate flood areas within this study. The Rocky River basin totals 293 square miles and includes parts of Cuyahoga, Lorain, Medina, and Summit Counties. Table 2 gives a breakdown of drainage areas within the Rocky River basin.

SETTLEMENT - In contrast to the city of Medina, the four communities of Hardscrabble, Valley City, Abbeyville, and Weymouth have not grown appreciably since their founding in the early 1800's.

Nathan Bell surveyed and plotted the Village of Marysville, or Hardscrabble as it is now known, in 1837. It was named Marysville after Mary Coit, whose husband was one of the heirs to this parcel of land. The name Hardscrabble was later bestowed upon the Village.

The village of Liverpool Center now known as Valley City, was laid out and plotted by Abraham Freese. A foundry, established by Charles Pritchard the year the village was plotted, manufactured plows, road scrapers, andirons, flat irons, and engines. Mr. Pritchard sold out after 15 years to Noble & Johnson and the foundry continued to supply articles and implements to northern Ohio residents.

TABLE 2
DRAINAGE AREAS WITHIN THE ROCKY RIVER BASIN

Rocky River		:Distance: :upstream: :from the: : mouth	Drainage Area square miles	
		:tributary:	main stem	
Source	:	:	:	0.0
North Branch upstream of Plum Creek	:	:	:	15.2
Plum Creek	:	12.9	:	28.1
North Branch at mouth	41.5	:	:	61.1
West Branch upstream of Mallet Creek	:	:	:	87.4
Mallet Creek	32.5	18.1	:	105
West Branch upstream of Plum Creek	:	:	:	161
Plum Creek	15.6	17.7	:	179
East Branch upstream of Baldwin Creek	:	:	:	64.1
Baldwin Creek	17.7	10.0	:	74.2
East Branch at mouth	12.45	76.9	:	267
Main stem at gage	12.4	:	:	267
Main stem upstream of Abram Creek	:	:	:	268
Abram Creek	10.7	10.2	:	279
Main stem at mouth	0.0	:	:	293

In 1831, Levi Janes purchased 600 acres of land in the northeast part of York township, the present location of Abbeyville. During the 1831-32 winter he had two mills built on the Rocky River, near the present site of Abbeyville. One was used for sawing wood and the other for grinding grain.

The first grist-mill in Medina township was built in Weymouth in 1818 by Capt. Lathrop Seymour.

The city of Medina located southwest of the confluence of the North and West Branches was laid out in 1818 and named Mecca after the city in ancient Arabia. Elijah Boardman of Connecticut agreed to donate a plot of land, now the square of Medina City, providing that Medina became the county seat. The name Mecca was changed to Medina in 1825 and incorporated under the Ohio Code as a village in 1835.

In 1818 the first building in Medina was built by Badger and Hickox on the present site of the Revco drugstore, just off the village square.

Until 1865, saw mills and cheese factories were the major industries in Medina. In 1865, A.I. Root established a factory specializing in bee-keeping supplies. This company which is the oldest existing industry in Medina initiated Medina's slogan, "The Sweetest Town on Earth."

In 1950 with a population exceeding 5,000 Medina became a city. The population has since doubled and industry has more than doubled since 1960.

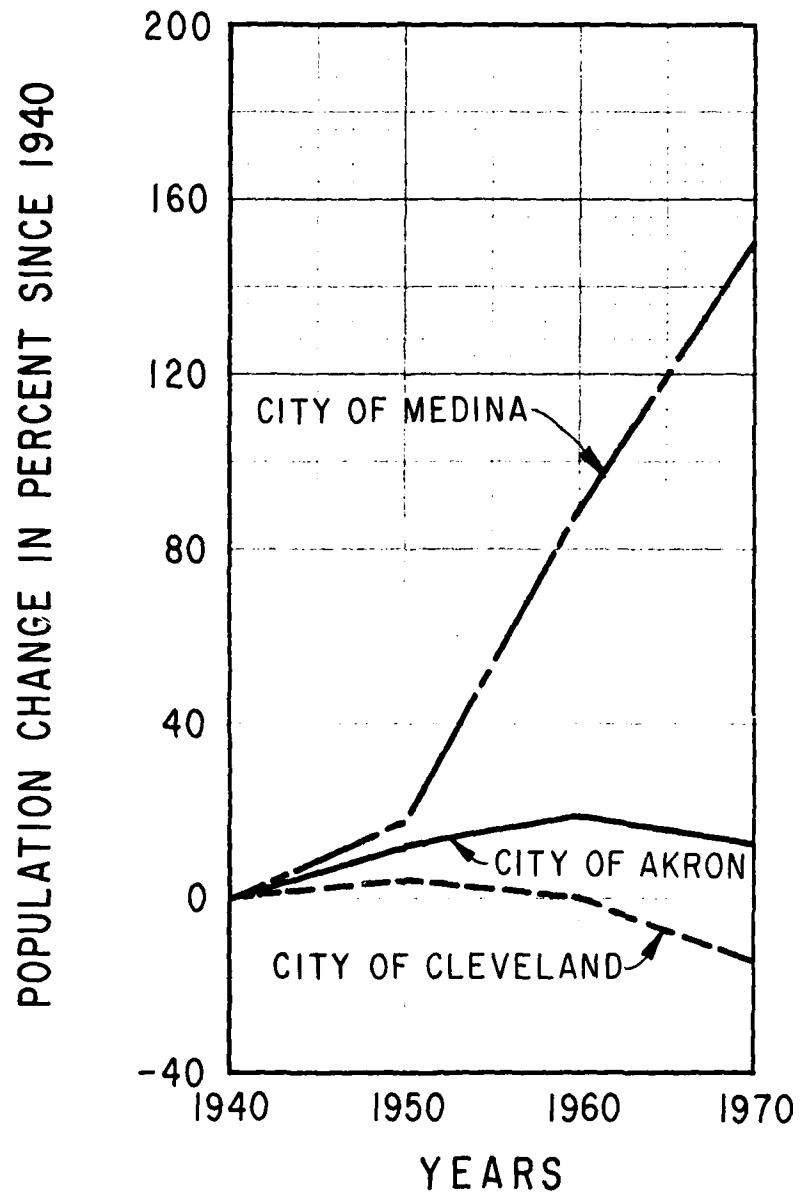
POPULATION - Figure 1 indicates that since 1940 the population of Medina has increased 150 percent while the city of Akron increased only 12 percent and Cleveland decreased 15 percent. In the last 20 years the city of Medina has experienced a tremendous growth rate which indicates that the low lands adjacent to the Rocky will be more appealing to future residents. Therefore, it is important

that local governments initiate flood plain regulations before people move into flood prone areas.

EXISTING REGULATIONS - Presently there are no regulations within the flood plain regarding building or the use of lands subject to flooding. Flood plain regulations could be initiated by counties, municipalities, and townships under their regular zoning and building code statutes. Samples of flood plain regulations passed in communities throughout the country are available at the Buffalo District office.

This report provides local governments with sufficient information to develop effective flood plain regulations.

In the State of Ohio, the power to adopt and enforce zoning regulations is delegated to political subdivisions. The enabling statutes are sections 303.02, 519.02 and 713.07 of the revised code. The General Assembly of the State of Ohio has passed an amendment to House Bill No. 314 that states, all departments and agencies of the State shall notify and furnish to the Division of Water information on State facilities which may be affected by flooding. This information is required in order to avoid the uneconomical, hazardous, or unnecessary use of flood plains in connection with State facilities. The amendment further reads that where economically feasible, departments and agencies of the State and political subdivisions responsible for existing publicly owned facilities shall apply flood proofing measures in order to reduce potential flood damage. Under Executive Order 11296, the Federal Government has similar restrictions in that all Federal agencies directly responsible for the construction of Federal facilities shall evaluate flood hazards when planning the location of new facilities. In addition, this order requires that Federal agencies responsible for administration of Federal grants, loans or mortgage insurance programs shall evaluate flood hazards in order to minimize potential flood damage and the need for possible



POPULATION TRENDS

future Federal expenditures for flood protection and flood disaster relief.

FLOOD WARNING AND FORECASTING SERVICES - Presently there are no specific flood warning or forecasting services for the Rocky River basin. However, the study area is well within the effective range of the Weather Surveillance Radar operated continuously by the U. S. Weather Service at the Cleveland and Akron-Canton Airport Stations. Weather Service equipment provides for the early detection of a storm and makes possible immediate radio and television broadcasts of information concerning the predicted path and amount of rainfall.

THE STREAM AND ITS VALLEY - The Rocky River basin flows into Lake Erie between the cities of Lakewood and Rocky River approximately 6.5 miles west of the main entrance to Cleveland Harbor. The basin consists of two main (East and West) branches. The East branch begins in North Royalton in southern Cuyahoga County, flowing southerly, northwesterly and northeasterly to Lake Erie; the West Branch begins 5 miles southeast of the city of Medina and flows north joining the North Branch 1-mile northeast of Medina. In their upper reaches the East and West branches flow with moderate slopes in broad valleys. As these branches approach, they drop in a series of cascades into deep narrow gorges. The West Branch has a number of falls and rapids in the vicinity of Olmsted Falls. Below the confluence of the East and West Branches, the main river flows through a narrow winding, rockwalled valley, about 100 to 120 feet below the level of the adjacent ground. The width of the valley floor is generally about 300 feet and access is very difficult. The slope of the West Branch through Olmsted Falls is relatively steep, averaging 60 feet per mile. Upstream of Olmsted Falls, the river slope averages two feet per mile and within this study area averages 12 feet per mile. Figures 2 and 3 show the condition of the West Branch-Rocky River channel.



Figure 2 - Looking downstream from Abbeyville Road bridge, stream mile 34.8. Note rock bank and dense vegetation.



Figure 3 - Looking southeast from Hamilton Road, near Bayer Road, at Oxbow, stream mile 35.1.

Channel conditions in study area
Photos taken March 1971

DEVELOPMENT IN THE AREA - Plates 4 through 7 indicate the extent of overbank flooding along the Rocky River in this study area. In spite of the tremendous growth of the City of Medina in the past two decades, residential encroachment of the flood plain has been slight. There are some greenhouses and quarry operations within the flood plain but most of the land is rural and undeveloped with the exception of farming.

The tendency to build in the flood plain will probably increase as high ground becomes scarce. It would be advantageous for local governments to establish flood plain regulations before further development occurs.

To provide for future water demands, a 600,000,000 gallon reservoir (1,840 Ac ft), shown on Figure 4, was built by the City of Medina in 1964. This reservoir is normally maintained at a maximum pool elevation of 930 feet. Figures 5 through 7 show some examples of wise development in the Rocky River flood plain within this study area.

BRIDGES ACROSS THE STREAM - There are 16 highway bridges, a farm bridge, one railroad bridge, and a dam which cross the Rocky River within this study. Table 3 lists the pertinent elevations for these bridges and the corresponding stages caused by the Intermediate Regional Flood and Standard Project Flood. Figures 8 through 12 show some of the bridges that are located within this study area.

Head losses (defined in the Glossary of this report) determined from hydraulic computations are shown on the water surface profiles of plates 8 through 10. The maximum head loss occurs at the Baltimore & Ohio Railroad bridge. The major causes of this abrupt loss is attributed to the steep stream slope upstream of the bridge and the high railroad embankment which limits any appreciable overbank flow around this bridge.

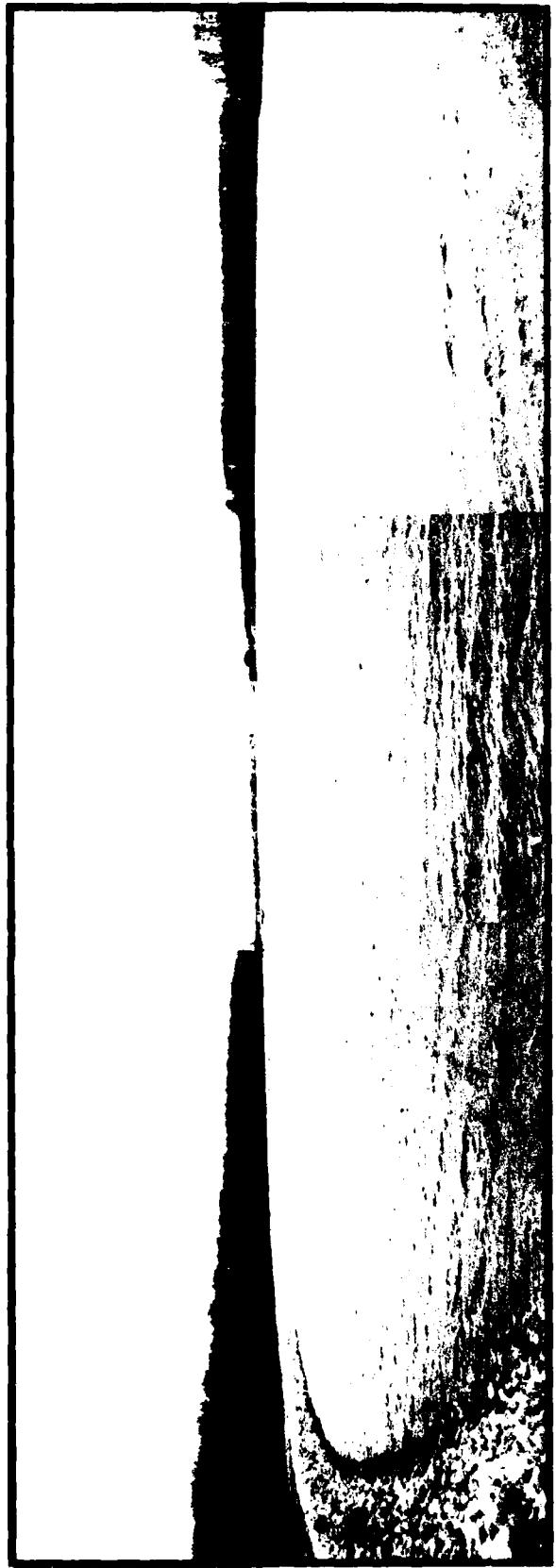


Figure 4 - Looking north at Medina City Reservoir, located just south of Granger Road at stream mile 41.6. At the maximum elevation of 930 the reservoir covers 1009 acres. (Photo shows reservoir at elevation 929.5.)

Development in the flood plain
Photo taken March 1970



Figure 5 - Looking upstream from Wolff Road at elevated house on left bank. Note west branch of Rocky River at much lower elevation to left of house, stream mile 34.9.



Figure 6 - Looking toward Rocky River at Private Park from downstream right bank of Pearl Road, near stream mile 36.0.

Good flood plain practice
Photos taken March 1971



Figure 7 - Looking from left bank toward elevated house upstream of Remsen Road bridge, stream mile 47.1.

Good flood plain practice
Photo taken March 1971

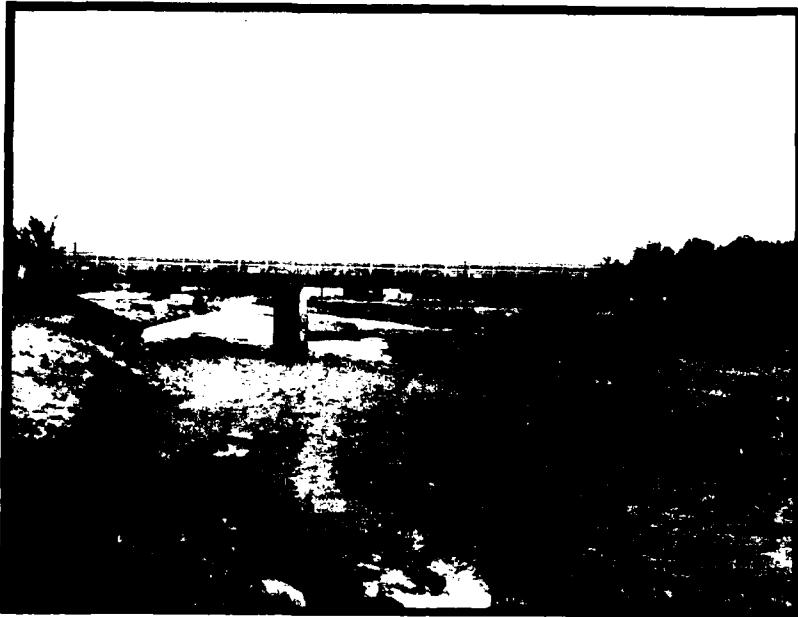


Figure 8 - Looking downstream at Ohio State Route 303 bridge, stream mile 30.29.



Figure 9 - Looking downstream at Baltimore & Ohio Railroad bridge, stream mile 32.75.



Figure 10 - Looking downstream at farm bridge, stream mile 36.52.

Bridge across West Branch of Rocky River
Photos taken March 1970



Figure 11 - Looking downstream at Bagdad Road bridge,
stream mile 43.10.



Figure 12 - Looking downstream at Cook Road bridge,
stream mile 45.39.

Bridges across North Branch of Rocky River
Photos taken March 1971

TABLE 3
BRIDGES ACROSS ROCKY RIVER

MILE ABOVE MOUTH	IDENTIFICATION	STREAM BED ELEV.	FLOOR ELEV. (1)	PROJECT ELEV. (2)	STANDARD		INTERMEDIATE		UNDERCLEARANCE LOW STEEL ELEV. (3)
					FLOOD CREST	ELEV. (2)	REGIONAL	FLOOD CREST	
28.02	Grafton Road	778.4	794.7	800.0	794.4	792.8	807.8	809.8	
30.29	Ohio State Route 303	794.2	816.9	815.4	807.8	809.8	822.4	824.4	
31.53	Ohio State Route 252	807.8	828.6	830.6	838.4	836.4	851.6	854.4	
32.75	Baltimore & Ohio Railroad	825.8	879.4	851.2	856.4	851.6	875.8	875.0	
33.42	Neff Road	837.7	857.2	856.4	883.7	883.7	883.7	889.5	
34.85	Abbeyville Road	862.7	878.8	883.7	875.8	875.8	875.0	875.0	
35.55	Marks Road	870.0	897.1	890.7	891.7	891.7	891.7	887.8	
36.52	Farm Bridge	871.3	888.8	895.0	896.8	896.8	898.8	897.4	
38.02	U.S. Route 42 (Pearl Road)	880.6	903.6	906.1	906.1	906.1	906.8	897.4	
38.92	Fenn Road	882.0	900.0	906.8	906.8	906.8	908.6	910.1	
41.10	Ohio State Route 3 (Weymouth Road)	890.8	918.0	916.6	916.6	916.6	915.1	912.0	
41.92	Granger Road	899.1	914.3	918.5	943.9	938.5	940.6		
43.12	Bagdad Road	927.1	942.6	1004.0	1016.9	1012.4	1008.0		
45.39	Cook Road	984.6	997.2	1020.0	1026.6	1027.1	1024.9		
45.87	Nichols Road	998.2	1010.4	1016.9	1020.0	1016.0	1049.7		
46.30	U.S. Route 71	1006.0	1059.9	1034.5	1034.5	1027.1	1024.9		
47.10	Ramsen Road	1013.0	1026.6	1026.6	1026.6	1026.6	1026.6		

- (1) The elevations of the top of road over the right and left bank side of the bridges are not always the same because of the slope of the road. In these cases the highest elevation is indicated.
- (2) All elevations refer to upstream side of respective bridges.
- (3) The elevation of the low steel adjacent to the right and left bank are not always the same because of the slope of the road. In these cases the lowest elevation is indicated.

OBSTRUCTIONS TO FLOOD FLOWS - Inadequate bridge areas, abandoned dams, encroachments, fills, bends in the stream, irregularity of channel section, heavy brush, and large trees growing on the channel banks and extending into the stream, are all obstructions to flood flows. Figures 13 through 16 show obstructions within this study which tend to reduce floodway capacity and increase river stages.

To keep obstructions of flood flows to a minimum each community should establish a maintenance program for streams within their area. For example, highway crews during slack periods could remove fallen trees, shoals and debris that may have collected in the channel. A concentrated effort should be made by the people not to throw refuse or other matter into the streams. The local government should establish a floodway, a strip of land on either side of the river, that would be kept free of obstructions to flood flows. Floods have occurred in the past and they will come again. A floodway provides room for future flood flows.

When the old Ohio State Route 252 was replaced, three tiers of stone were removed from the abutments. The remaining foundation as shown on figure 13 results in the increased river stages shown on plate 9 at mile 31.3.



Figure 13 - Looking downstream from Cossett Creek outlet toward abandoned Ohio State Route 252 bridge abutment, stream mile 31.3.



Figure 14 - Looking downstream from Marks Road toward debris on left bank, stream mile 35.5. These dead and fallen trees are not presently a hazard although, they could be a potential threat if, during high water they floated downstream and collected in restricted areas.

Obstructions to flood flows
Photos taken March 1971

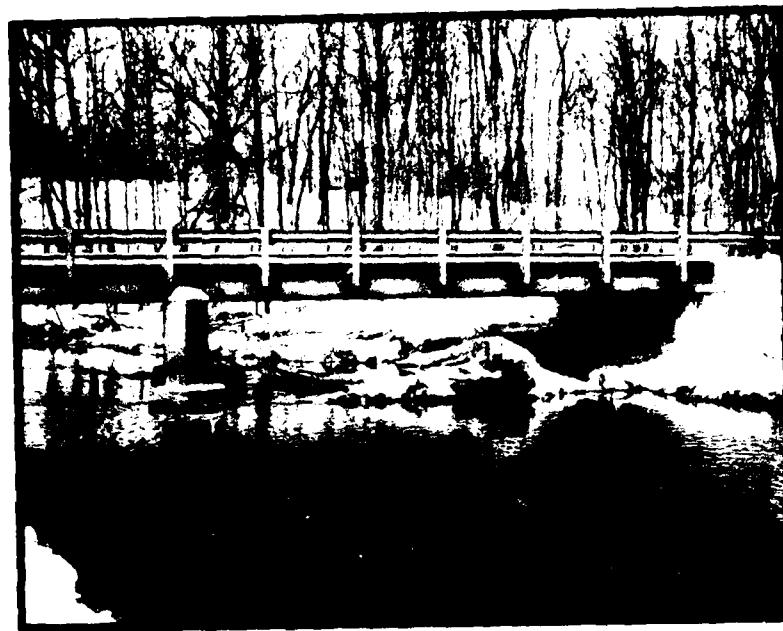


Figure 15 - Looking downstream toward debris at Nichols Road bridge, stream mile 45.9.



Figure 16 - Looking downstream from left bank at abandoned collapsed Remsen Road bridge located 0.8 of a mile upstream from this study.

Obstructions to flood flows
Photos taken March 1971

FLOOD SITUATION

FLOOD RECORDS - A water-stage recorder has been in operation since September 1943 at the downstream side of Cedar Point Road, 3 miles northwest of Berea. This gage provides a continuous record of the rise and fall of Rocky River resulting from the runoff of 267 square miles of watershed.

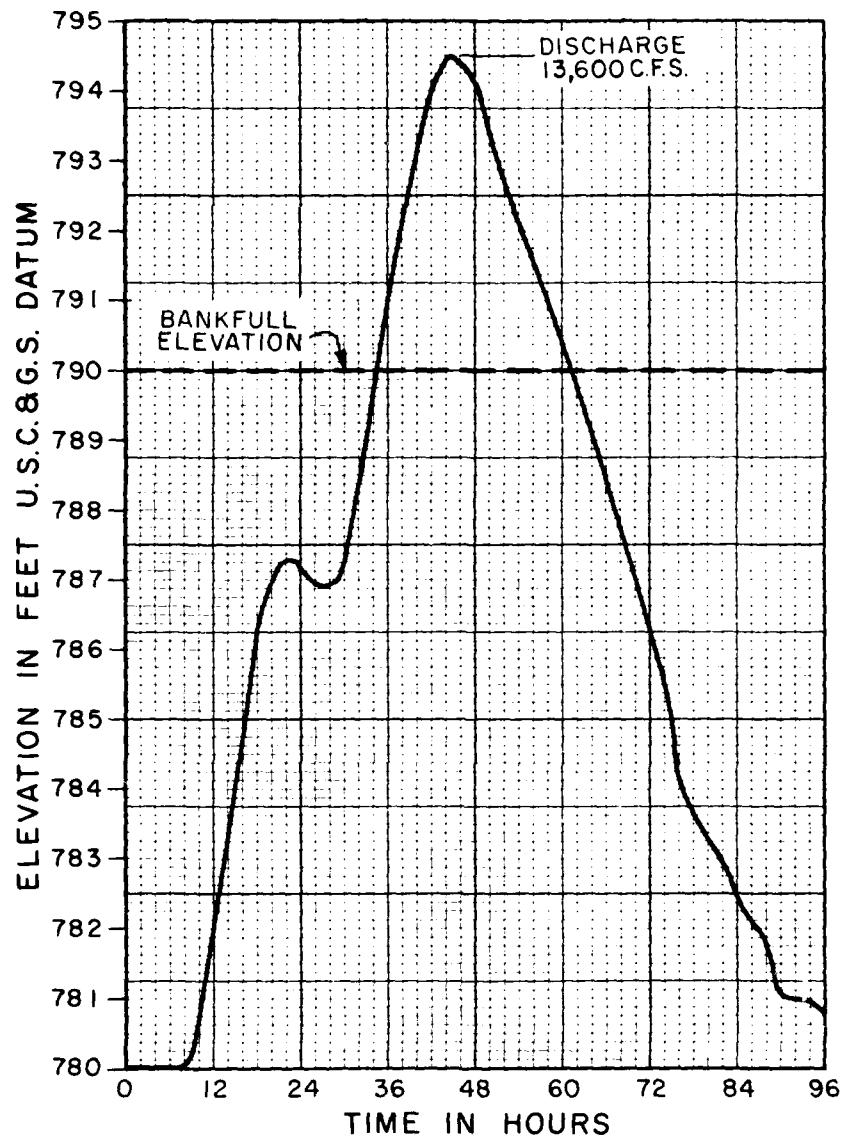
High stages at Berea are not a direct indication of flooding conditions in the study area. The drainage area within this study varies from 133 square miles at stream mile 26.4, the downstream limit, to 28 square miles at stream mile 47.1, the upstream limit. Therefore, the hydrologic conditions in the study area and at the gage are sometimes quite different.

Since the correlation of existing gage records are not always comparable it was necessary to supplement gage records by interviewing local residents for information on past floods. Newspaper files, historical documents and records were also searched.

FLOOD STAGES AND DISCHARGES - Upstream of Grafton Road, overbank flooding occurs at approximately 2,600 cfs. The Intermediate Regional Flood, a discharge of 13,600 cfs, would exceed top of bank by 4.5 feet.

DURATION AND RATE OF RISE - Shown on plate 2 is the estimated stage hydrograph of the Intermediate Regional Flood (IRF) just upstream of Grafton Road. During the IRF the river is expected to reach its peak in 36 hours at an average rate of 0.40 foot per hour and remain above bankfull stage for approximately 27 hours.

VELOCITIES - The channel velocities for the Intermediate Regional Flood vary from 3 to 9 feet per second. The overbank velocities for this same flood vary from 1 to 4 feet per second. The wide range in velocities is attributed to the variation of the shape and area of the channel and overbank, the change in the slope of



WEST BRANCH ROCKY RIVER
RIVER MILE 28.09

WEST BRANCH
ROCKY RIVER
MEDINA COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
STAGE HYDROGRAPH OF
INTERMEDIATE REGIONAL FLOOD
U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER 1971

PLATE 2

the channel bottom, vegetation along the banks, bridges, dams and other man-made structures.

FLOODED AREAS, FLOOD PROFILES, AND CROSS SECTIONS - Plates 4 through 7 show the approximate areas along the West and North Branches of the Rocky River that would be inundated by the Intermediate Regional and Standard Project Floods. The actual limits of the overflow areas may vary somewhat from those shown on the map because the 10-foot contour interval and scale of the map do not permit precise plotting of the flood area boundaries. The purpose of the flood maps is to identify the approximate areas subject to flooding so that flood hazards can be considered before development occurs.

The water surface profiles for the Intermediate Regional and Standard Project Floods are shown on plates 8, 9, and 10. These flood profiles provide the necessary information for locating future construction above the flood elevations and for developing an effective regulation plan.

Cross sections that are representative of the flood plain are shown on plates 11 through 13. The location of these cross sections are shown on plates 4 through 7. The depth and approximate limits of flooding for the Intermediate Regional and Standard Project Floods are indicated on these sections.

FLOOD DESCRIPTION

Descriptions of known large floods that have occurred on the West and North branches of the Rocky River are based on field investigations, historical records, and newspaper accounts. The greatest flood of historical record occurred in March 1913. A condensation of available information on this and other significant floods given in the following paragraphs is presented as an example of the type and extent of flood problems which have occurred and as an indication of possible future flood problems.

Flooding has occurred from excessive rainfall during the summer and also from varying combinations of snowmelt, rainfall, and ice jamming during winter and early spring.

23-28 MARCH 1913 - The storm which caused the highest record stage at the Berea gage developed from the stagnation of a tropical marine air mass from the Gulf of Mexico against a cold air mass from Canada. Heavy rains occurred during the periods 13-15 and 20-21 March. These rains were only preliminary to the severe storm which developed during the period of 23-27 March. This storm extended from Texas to Lake Erie with its center over Bellefontaine, Ohio, 125 miles southwest of the Rocky River basin. Two low-pressure centers caused excessive rainfall in Ohio and neighboring states for about 60 hours. Bellefontaine recorded a total of 11.16 inches of rainfall in 92 hours. If a flood of this magnitude was to occur today, most of the area inundated by the Standard Project Flood as indicated on plates 4 through 7 would be covered by high water.

28 JUNE 1924 - Winds up to 100 miles per hour were estimated by Captain Arborts while piloting the Oswichee, a 95-foot seagoing gasoline yacht, from Rocky River to the Vermillion River between 1:22 p.m. and 7:30 p.m. 28 June 1924. This storm was not concentrated to a specific area but rather quite widespread as indicated by the recorded rainfalls in 24 hours or less: Akron, 4.30 inches;

Danbury, 2.74 inches (1.25 inches falling in 10 minutes); Fremont, 3.32 inches; Hiram, 2.70 inches; Medina, 2.50 inches; Oberlin, 4.04 inches (3.79 inches falling in little over one hour); Vickery, 2.88 inches.

The Berea Enterprise recorded unusually high winds and rain in the Valley City area. The wind damaged several buildings and trees. A large portion of the village was inundated from late Saturday evening until about noon Sunday. Some families were forced to take refuge in the upper story of their homes while others had to be rescued by boat. The water was three to four feet deep over many roads. Plate 8 shows the elevation of a 28 June 1924 high watermark (HWM) located just upstream of Ohio State Route 303. Although the elevation of the Intermediate Regional Flood is lower than this HWM, the recently completed channel improvement and now less restrictive Route 303 bridge would significantly reduce the elevation of another flood of the 28 June 1924 magnitude.

20-21 JANUARY 1959 - The January 1959 flood caused severe damage not only in the Rocky River basin but throughout the State of Ohio. The storm that produced this great flood developed from a large mass of cold air over northwestern Canada, a flow of warmer air from the southwest and the associated frontal system. Heavy rains began on the 20th when the moisture-laden air from the south and a cold front converged. Although total rainfall for the storm was not excessive, intensities were high and runoff was rapid because of the frozen ground and the six-inch snow cover over the basin.

There have been other less publicized floods in this region. Frequently roads and overbanks are covered by high water and/or ice as shown on figures 17 through 19. Further information of the relative severity of these floods is not available.

This concludes the "General Conditions and Past Floods" section of this report. But what can be done to prevent and/or reduce future flood damages?

Using the information in this report as a guide, local governments can develop flood plain regulations to control the type of development that may be allowed in areas subject to flooding. The height of future floods can be determined by an examination of the profiles which are more exact than the flooded outlines. In general, any type of construction or use which is not affected by flooding should be encouraged on land frequently susceptible to flooding. Development which would be damaged by flooding should be placed on high ground. No structural development should ever be placed within the floodway limits.

To assist local governments to manage and control their flood plains, the U. S. Army Corps of Engineers has prepared and will, upon request, distribute to State, County, and local governments copies of pamphlets entitled, "Guidelines for Reducing Flood Damages" and "Introduction to Flood Proofing." These pamphlets together with information presented in this report will facilitate local governments in reducing damage to existing and future development within the flood plain of Rocky River in Medina County, Ohio. Figure 20 lists the corrective and preventive measures described in the above-mentioned pamphlets. The U. S. Army Corps of Engineers will distribute to State, County, and local governments other helpful pamphlets, as well as additions to existing pamphlets, as they are developed.



Figure 17 - Flooding conditions on
29 January 1970 at Grafton Road
bridge, stream mile 28.02.



Figure 18 - 1968 high water at
Nichols Road bridge, stream
mile 45.87.



Figure 19 - 1938 high water conditions at Nichols Road,
stream mile 45.87.

Flood scenes
Figure 18 and 19 courtesy of Mrs. Dreibelbis
Medina, Ohio

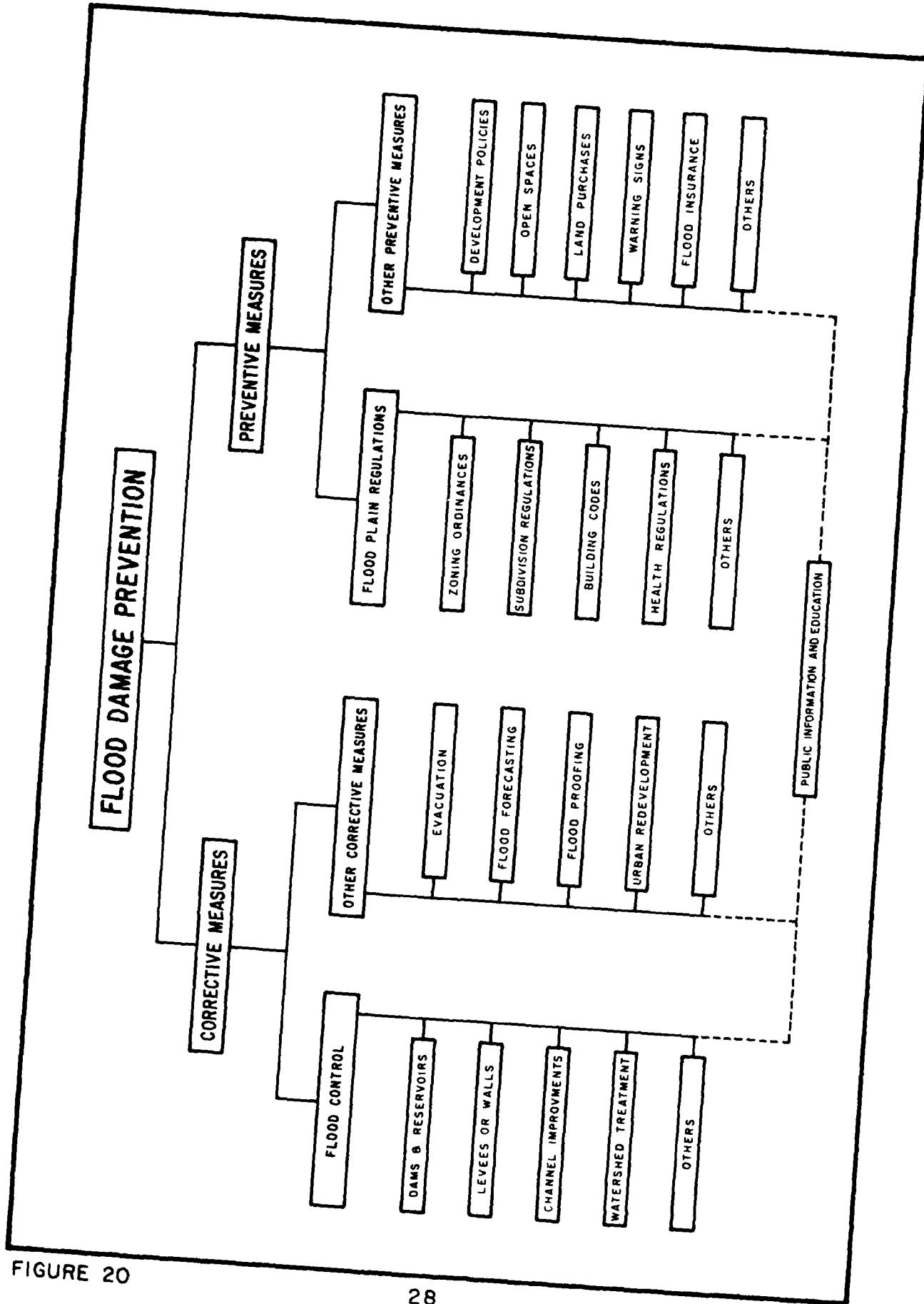


FIGURE 20

FUTURE FLOODS

Large floods have been experienced on streams in the general geographical region of this study. Climatological conditions similar to those causing these floods could occur over the Rocky River Basin. In this connection our determination of future floods on the Rocky River included storms and floods that have occurred in the general region. Table 4 lists the maximum known floods that have occurred at various U.S.G.S. gaging stations in the vicinity of the Rocky River basin.

Recently on 4 July 1969, a storm in northern Ohio produced floods on the Huron, Vermillion and Black Rivers which exceeded the Intermediate Regional Flood of these streams. Rain exceeding 10 inches fell within fifteen miles southwest of this study. A flood approaching the Standard Project Flood, as shown on plates 4 through 7, would have resulted if this storm had occurred over the Rocky River basin.

TABLE 4
MAXIMUM KNOWN FLOOD DISCHARGES AT U.S.G.S. GAGING STATIONS
IN THE REGION OF ROCKY RIVER, OHIO

Stream	Location Ohio	Period	Peak discharge of record	Estimated recurrence interval (years)*			
		of (years)	Drainage area (sq. mi.)				
Sandusky River	Fremont (1)	44	1,251	10 Feb 1959:28,000 (2)	22.4	:	10
Huron River	Milan	20	371	5 July 1969:48,900	131.8	:	200
Vermilion River	Vermilion	18	262	6 July 1969:40,800	155.7	:	100
Black River	Elyria	25	396	6 July 1969:51,700	130.6	: greater than 200	
Cuyahoga River	Old Portage	46	404	21 Jan 1969: 6,500	16.1	:	200
Cuyahoga River	Independence (3)	41	707	22 Jan 1959:21,400 (4)	29.7	:	100
Chagrin River	Willoughby	40	246	22 Mar 1948:28,000	113.8	:	60
Rock Creek	Rock Creek	24	69	21 Jan 1959: 8,000	115.6	:	35
Mill Creek	Jefferson	28	82	22 Jan 1959: 9,810	119.6	:	200
Grand River	Madison	45	581	22 Jan 1959:21,100	36.3	:	100
Ashtabula River	Ashtabula	41	121	22 Jan 1959:11,600	95.9	:	50
Conneaut Creek	Conneaut	34	175	22 Jan 1959:17,000	97.1	:	60
Rocky River	Berea	37	267	22 Jan 1959:21,400	80.1	:	70
						:	

* Based on conditions of development at time of flood.

(1) The estimated peak discharge of the maximum flood of record was 63,500 cfs for the 1913 flood.
 It has an exceedence interval of about 500 years based on a discharge frequency basis and about 200 years on a stage-frequency basis.

(2) Estimated by U.S.G.S.

(3) The estimated peak discharge of the maximum flood of record was 30,000 cfs for the 1913 flood.
 It has a recurrence interval on the order of once in 200 years.

(4) Estimated by Corps of Engineers.

DETERMINATION OF INTERMEDIATE REGIONAL FLOOD

The Intermediate Regional Flood has an average frequency of occurrence in the order of once in 100 years at a designated location; however, this flood could possibly occur in any year or in consecutive years. Our probability estimates for the Intermediate Regional Flood are based on a statistical analysis of streamflow records and includes an analysis of rainfall and runoff characteristics in the "general region" of the study area. The results of our analysis indicate that the Intermediate Regional Flood on the Rocky River at Berea would have a peak discharge of 22,000 cubic feet per second. Table 5 lists the discharges for the Intermediate Regional Flood at several locations in the study area.

DETERMINATION OF STANDARD PROJECT FLOOD

The Corps of Engineers, with the cooperation of the National Weather Service, has made broad and comprehensive studies and investigations of experienced storms and floods and has evolved generalized procedures for estimating the flood potential of streams. These procedures have been used in determining the Standard Project Flood, which is defined as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region involved. Only in rare instances would such a storm occur on any specific region.

A Standard Project Flood estimate was made for Rocky River at the Berea gage. The theoretical rainfall used in the estimate amounts to 5.56 inches in three hours, 8.30 inches in 6 hours, 11.08 inches in 24 hours, and 13.94 inches in 96 hours. These are average rainfalls over the drainage area upstream of the gage. Table 5 lists the Standard Project Flood peak discharges within the study area.

TABLE 5
INTERMEDIATE REGIONAL (IRF)
AND
STANDARD PROJECT FLOOD (SPF) PEAK DISCHARGES

Location	Stream Mile	DraInage Area (sq.mi.)	Discharge IRF (cfs)	Discharge SPF (cfs)
Lower Limit of Study	26.4	133	13,600	42,400
Upstream of Mallet Creek	32.5	87	9,600	31,000
North Branch at Mouth	41.5	38	5,200	16,800

FREQUENCY - It is not practical to assign a frequency to the Standard Project Flood. The occurrence of such a flood would be a rare event although, it could occur in any year. The Standard Project Flood is not the maximum flood that could occur, but it does indicate the reasonable upper limit of the flood plain.

POSSIBLE LARGER FLOODS - While floods larger than the Standard Project are theoretically possible, there would seldom exist the unusual climatological characteristics to produce such a flood. The minimum risk from possible future flood damages that a community is willing to accept should determine if and to what degree larger floods should be considered.

HAZARDS OF GREAT FLOODS

The amount and extent of damage caused by flooding depends in general upon how much and the type of development in the area being flooded, the height of flooding, the velocity of flow, the rate of rise, and the duration of flooding.

AREAS FLOODED AND HEIGHTS OF FLOODING - Areas in this study that would be flooded by the Standard Project and Intermediate Regional Floods are shown on plates 4 through 7. Depths of flow can be estimated from the crest profiles which are shown on plates 8 through 10.

The profiles of the Standard Project and the Intermediate Regional Floods were developed assuming that all bridge structures would stand and that no clogging would occur.

The Standard Project Flood varies from 12.8 feet higher at the Baltimore and Ohio Railroad to 3.4 feet higher at Granger Road than the Intermediate Regional Flood.

Figures 21 through 28 indicate the heights that would be reached by the Standard Project and Intermediate Regional Floods at various locations within the Rocky River flood plain.

VELOCITIES, RATES OF RISE AND DURATION OF FLOODING - Average channel velocities during a flood depends largely upon the size, shape, frictional resistance of the channel and overbank section, mean slope of the channel, and natural and man-made constrictions or expansions.

Table 6 lists the average velocities that would occur in the main channel and overbank areas for a discharge of Intermediate Regional Flood and Standard Project Flood magnitudes.

Rates of rise are dependent on the size, shape, and slope of the basin, intensity of the storm; development within the basin; and infiltration of rainfall. The condition of and amount of debris in the channel can have a large effect on the depth of flooding. Figures 13 through 16 show examples of debris that may increase

future flooding. The accumulation of ice, at constricted sections of channel, during winter and early spring thaws is also a cause of flooding. The January 1959 was mainly caused by ice jamming. Table 7 lists the estimated total rise from bankfull stage for the Intermediate Regional and Standard Project Floods just upstream of Grafton Road under free flow conditions. This means that the data listed in table 7 is based on the assumption that the storm was caused only by rainfall and not prolonged runoff from snowmelt or by ice jams. Should debris clogging or ice jamming occur at constrictions it would act as a dam and cause water to back up forming a pond. When sufficient head accumulates to break the jam, a surge of water would flow downstream causing an almost instantaneous rate of rise.

TABLE 6
INTERMEDIATE REGIONAL AND STANDARD PROJECT FLOOD VELOCITIES

Stream: mile	IRF Average Velocity		SPF Average Velocity	
	Channel ft. per sec.	Overbank ft. per sec.	Channel ft. per sec.	Overbank ft. per sec.
28.00	4.6	1.8	6.1	3.4
32.00	9.0	3.5	10.0	4.8
33.85	8.0	3.1	9.9	5.3
37.83	2.4	1.0	2.4	1.4
41.63	2.3	0.9	2.3	1.3
44.62	8.4	1.8	12.0	4.5
46.80	7.6	3.6	10.4	6.6

TABLE 7
RATES OF RISE AND DURATIONS OF FLOODING
UPSTREAM OF GRAFTON ROAD RIVER MILE 28.09

Flood	: Time of rise (I)	: Maximum rate of rise (I)	: Duration above bankful stage
	: (hrs)	: (ft/hr)	: (hrs)
Intermediate Regional	: 11	: 0.7	: 27
Standard Project	: 29	: 1.1	: 57

(I) Above bankfull conditions



Figure 21 - Arrows indicate the heights of the Standard Project and Intermediate Regional Floods at Grafton Road bridge, stream mile 28.02. Photo taken March 1970.



Figure 22 - Arrows indicate the heights of the Standard Project and Intermediate Regional Floods on Ohio State Route 303 in Valley City, Ohio, stream mile 30.29. Photo taken March 1971.

Possible future flood heights



Figure 23 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods at Ohio State Route 252 bridge, stream mile 31.53. Photo taken March 1970.

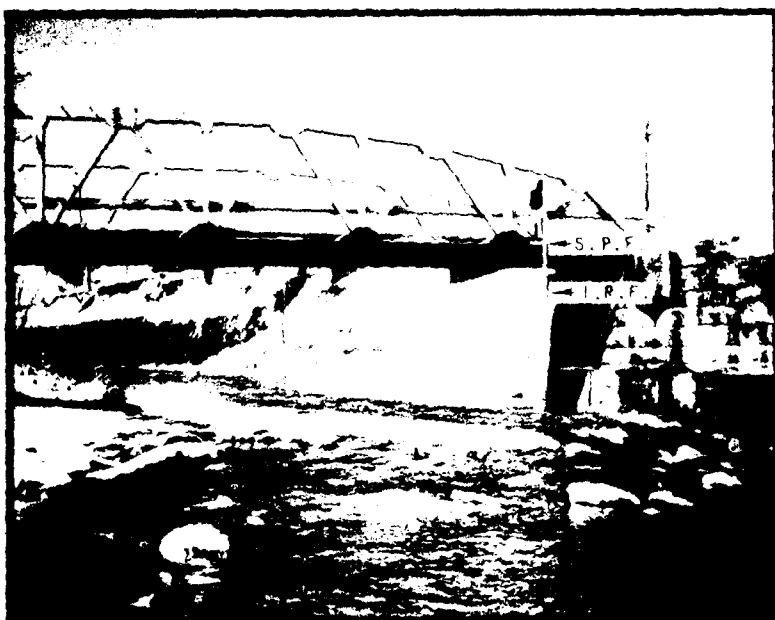


Figure 24 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods at Neff Road bridge, stream mile 33.42. Photo taken March 1971.

Possible future flood heights

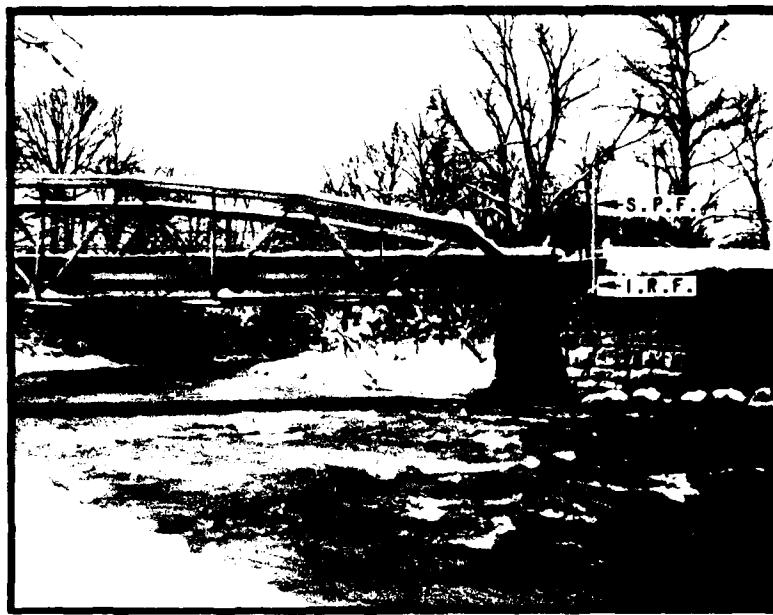


Figure 25 - Arrows indicate the heights of the Standard Project and Intermediate Regional Floods at Abbeyville Road bridge, stream mile 34.85.

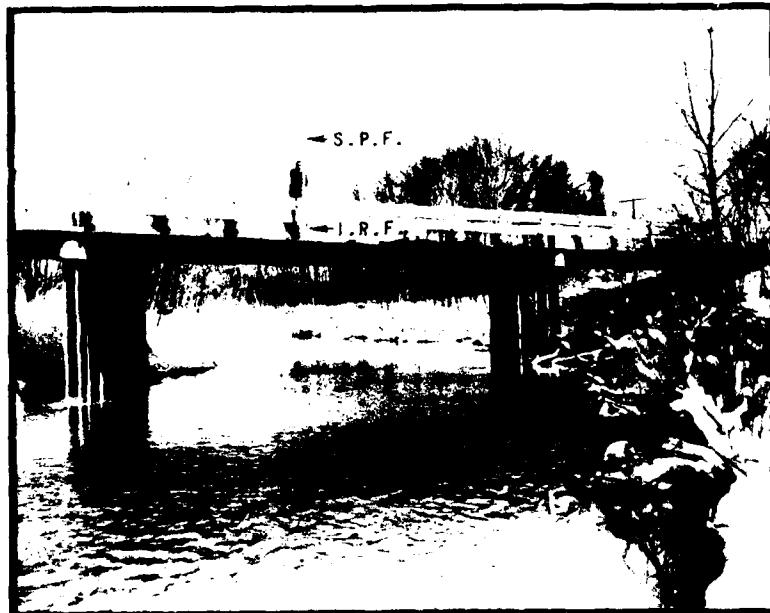


Figure 26 - Arrows indicate the heights of the Standard Project and Intermediate Regional Floods at Fenn Road bridge, stream mile 38.92.

Possible future flood heights
Photos taken March 1971



Figure 27 - Arrows indicate the heights of the Standard Project and Intermediate Regional Floods at the dam adjacent to the Medina City Waterworks, stream mile 42.0.

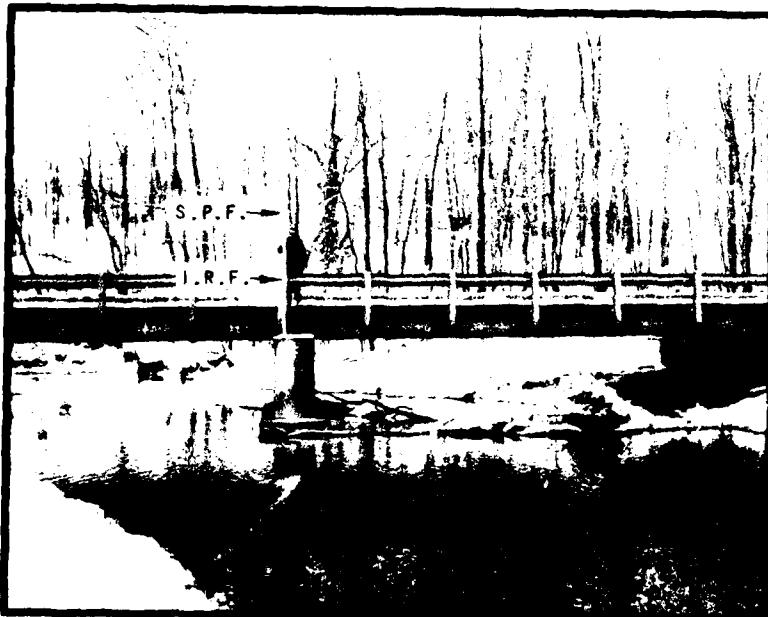


Figure 28 - Arrows indicate the heights of the Standard Project and Intermediate Regional floods at Nichols Road bridge, stream mile 45.87.

Possible future flood heights
Photos taken March 1971

GLOSSARY OF TERMS

Discharge. The quantity of flow in a stream at any given time, usually measured in cubic feet per second (cfs).

Flood. An overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characteristics: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river or stream or an ocean, lake, or other body of standing water.

Normally a "flood" is considered as any temporary rise in stream flow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased stream flow, and other problems.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak. The maximum instantaneous discharge of a flood at a given location. It usually occurs at or near the time of the flood crest.

Flood Plain. The relatively flat area or low lands adjoining the channel of a river, stream or watercourse or ocean, lake, or other body of standing water, which has been or may be covered by flood water.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth, for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

Head Loss. The effect of obstructions, such as narrow bridge openings or buildings that limit the area through which water must flow, raising the surface of the water upstream from the obstruction.

Hydrograph. A curve denoting the discharge or stage of flow over a period of time.

Intermediate Regional Flood. A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the "general region of the watershed."

Left Bank. The bank on the left side of a river, stream, or watercourse, looking downstream.

Low Steel (or Underclearance). See "underclearance."

Right Bank. The bank on the right side of a river, stream, or watercourse, looking downstream.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Peak discharges for these floods are generally about 40% to 60% of the Probable Maximum Floods for the same basins. Such floods, as used by the Corps of Engineers are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

Underclearance. The lowest point of a bridge or other structure over or across a river, stream, or watercourse that limits the opening through which water flows. This is referred to as "low steel" in some regions.

AUTHORITY, ACKNOWLEDGMENTS AND INTERPRETATION OF DATA

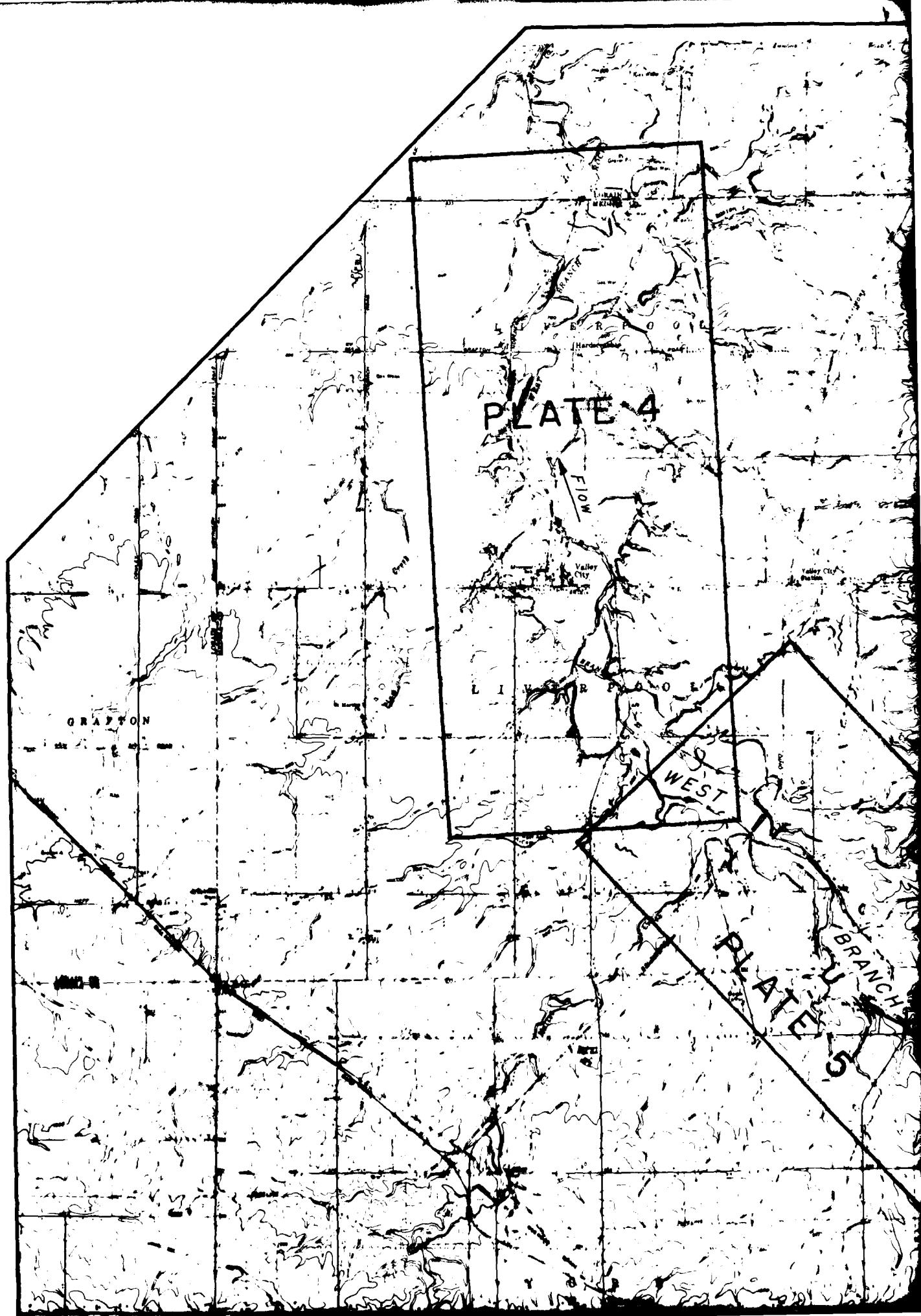
This report has been prepared by the Buffalo District of the U.S. Army Corps of Engineers in accordance with the authority granted by Section 206 of the Flood Control Act of 1960 (PL 86-465) as amended.

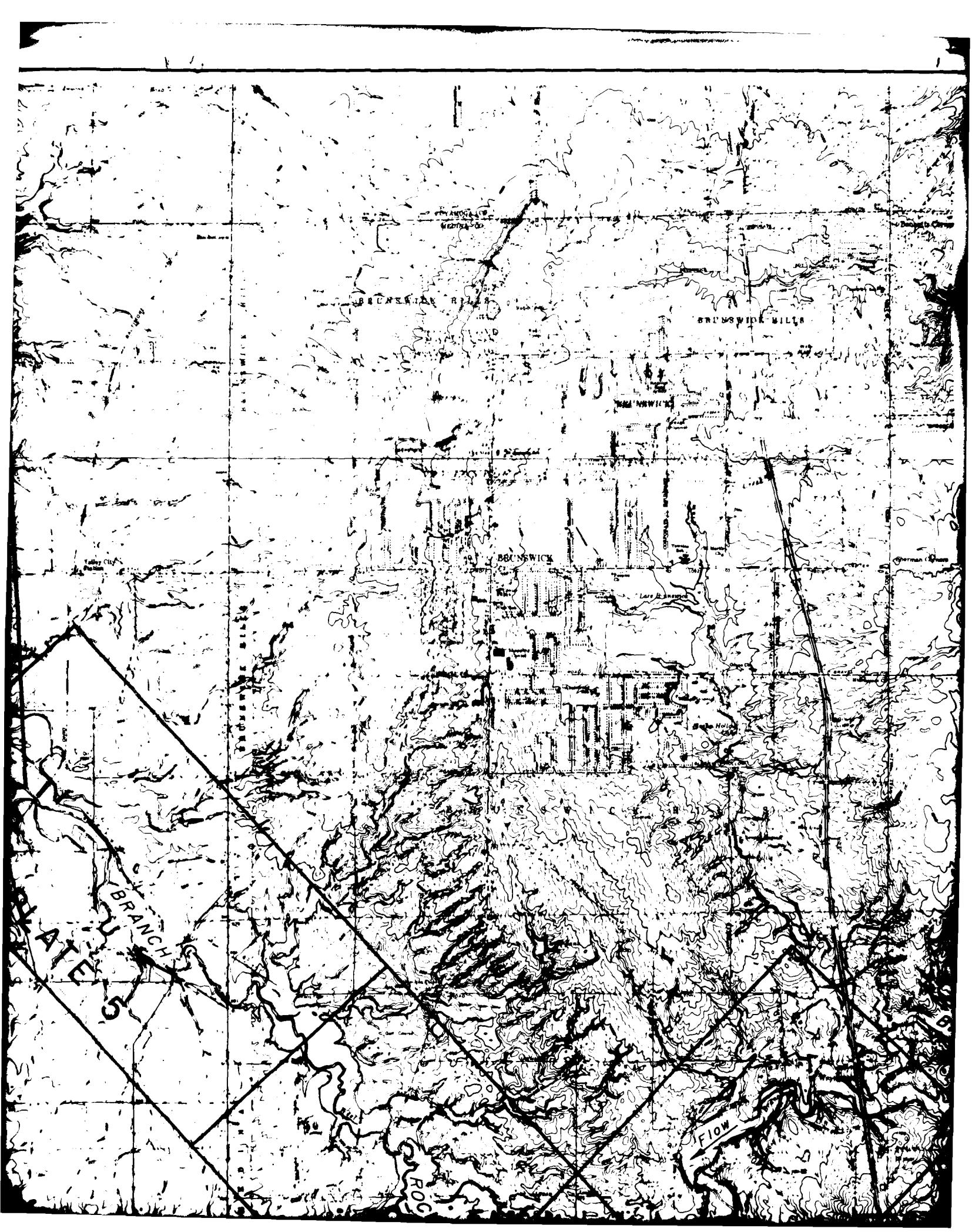
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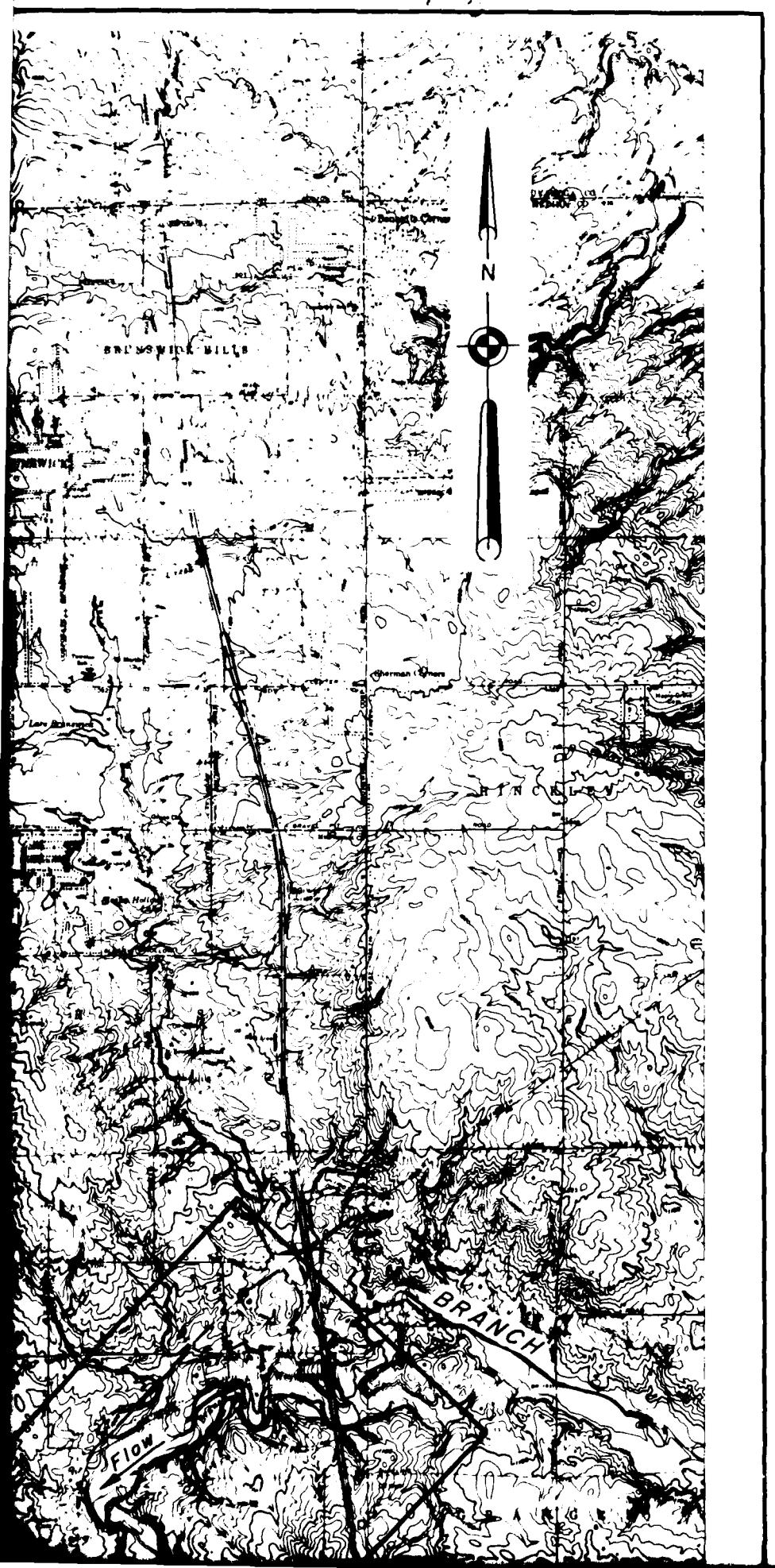
Assistance and cooperation of Federal, State and Local Agencies in supplying useful information is appreciated.

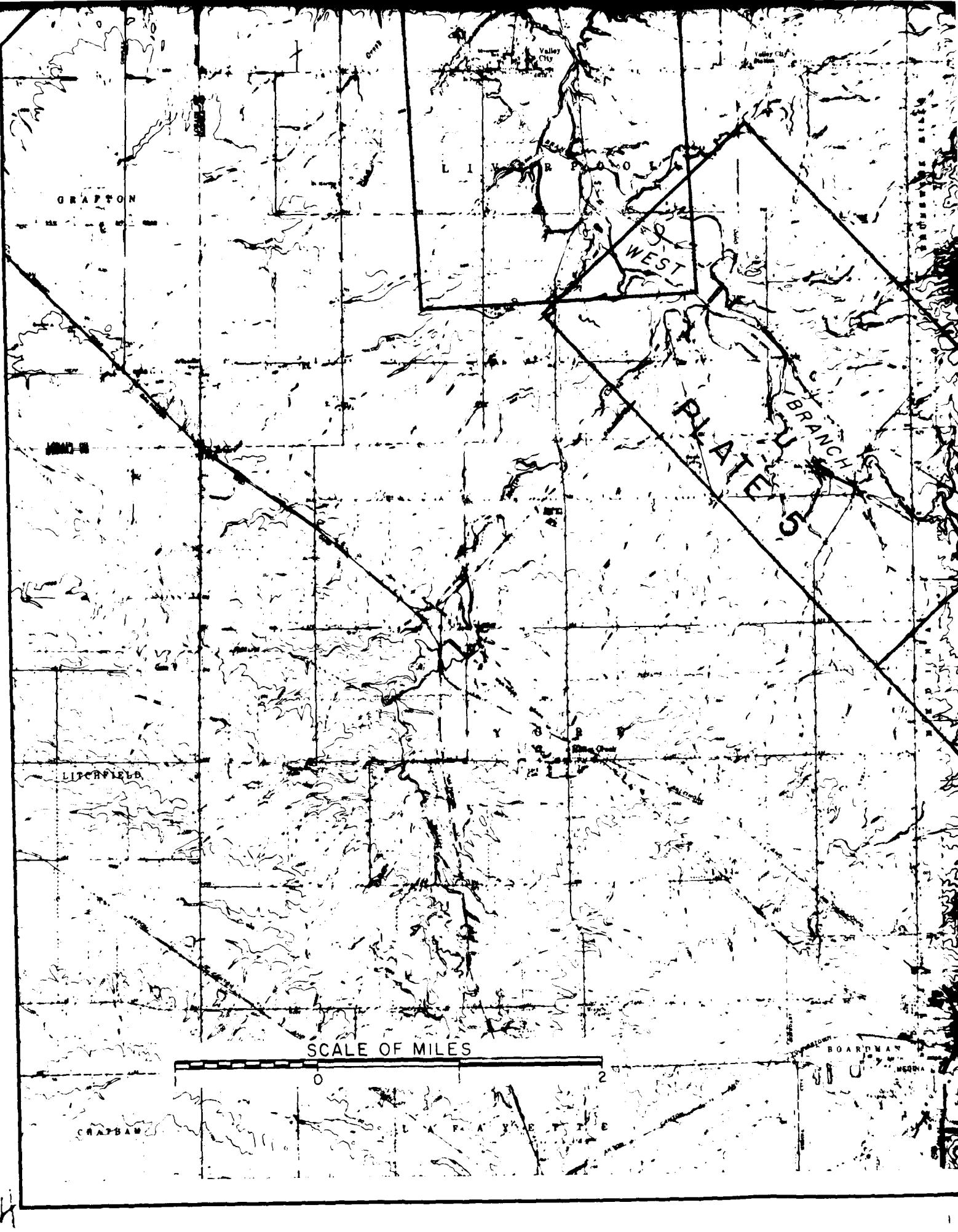
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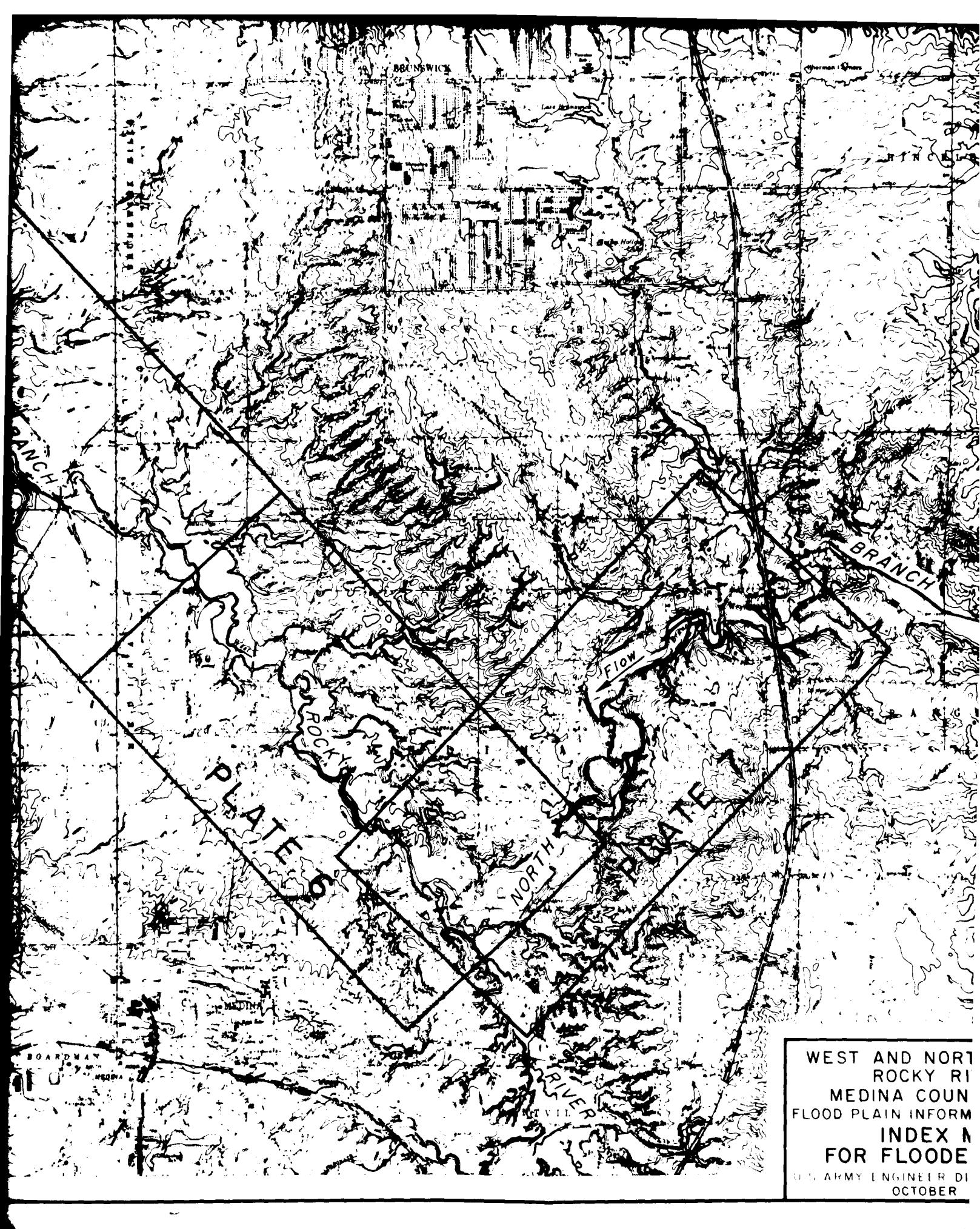
The Buffalo District will provide, upon request, interpretation and limited technical assistance in the application of these data, particularly as to their use in developing effective flood plain regulations. Requests should be coordinated through the Ohio Department of Natural Resources, Division of Water. After local authorities have selected the flood magnitude or frequency to be used as the basis for regulation, further information on the effects of various widths of floodway on the profile of the selected flood can be provided to assist in final selection of floodway limits.









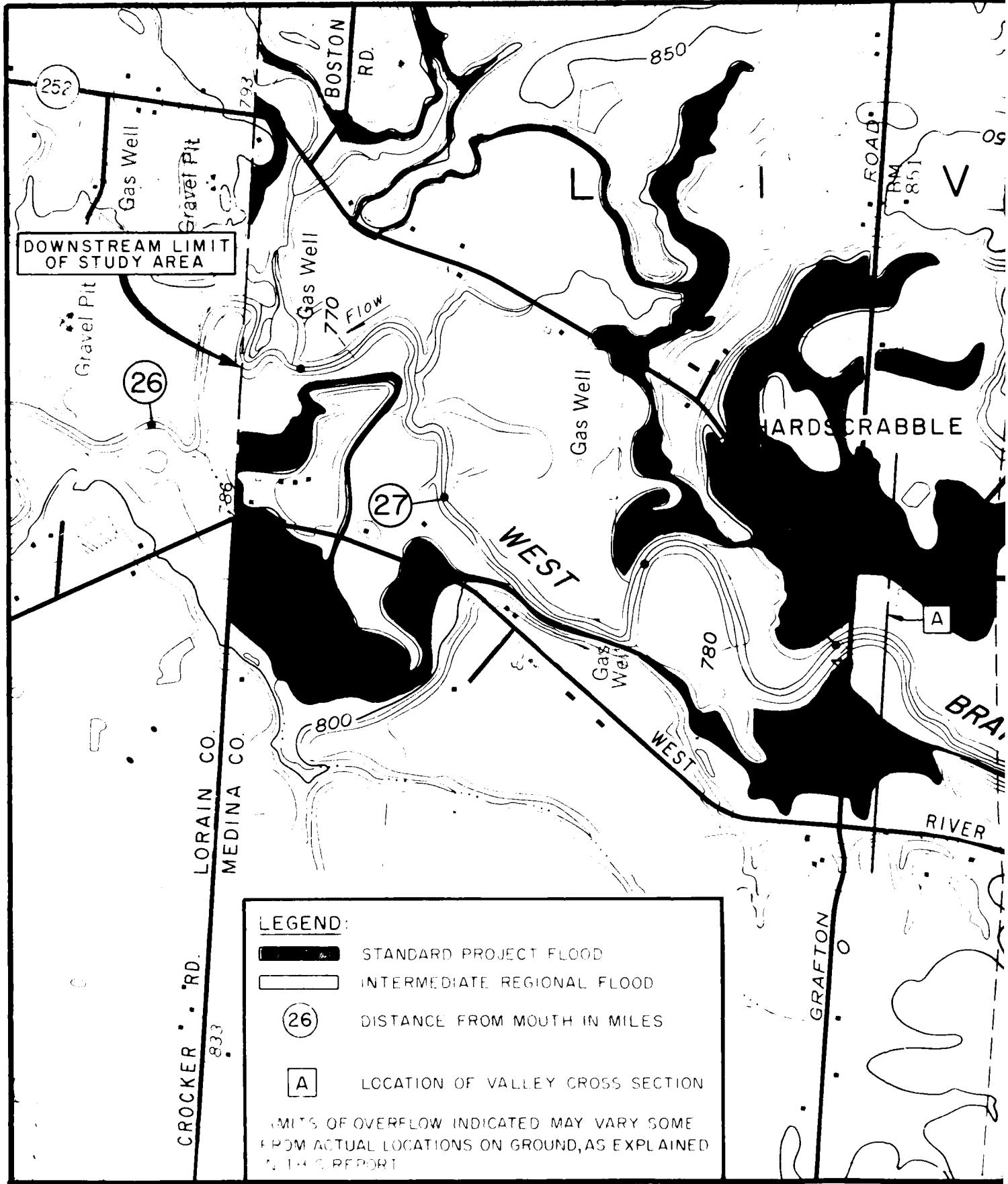


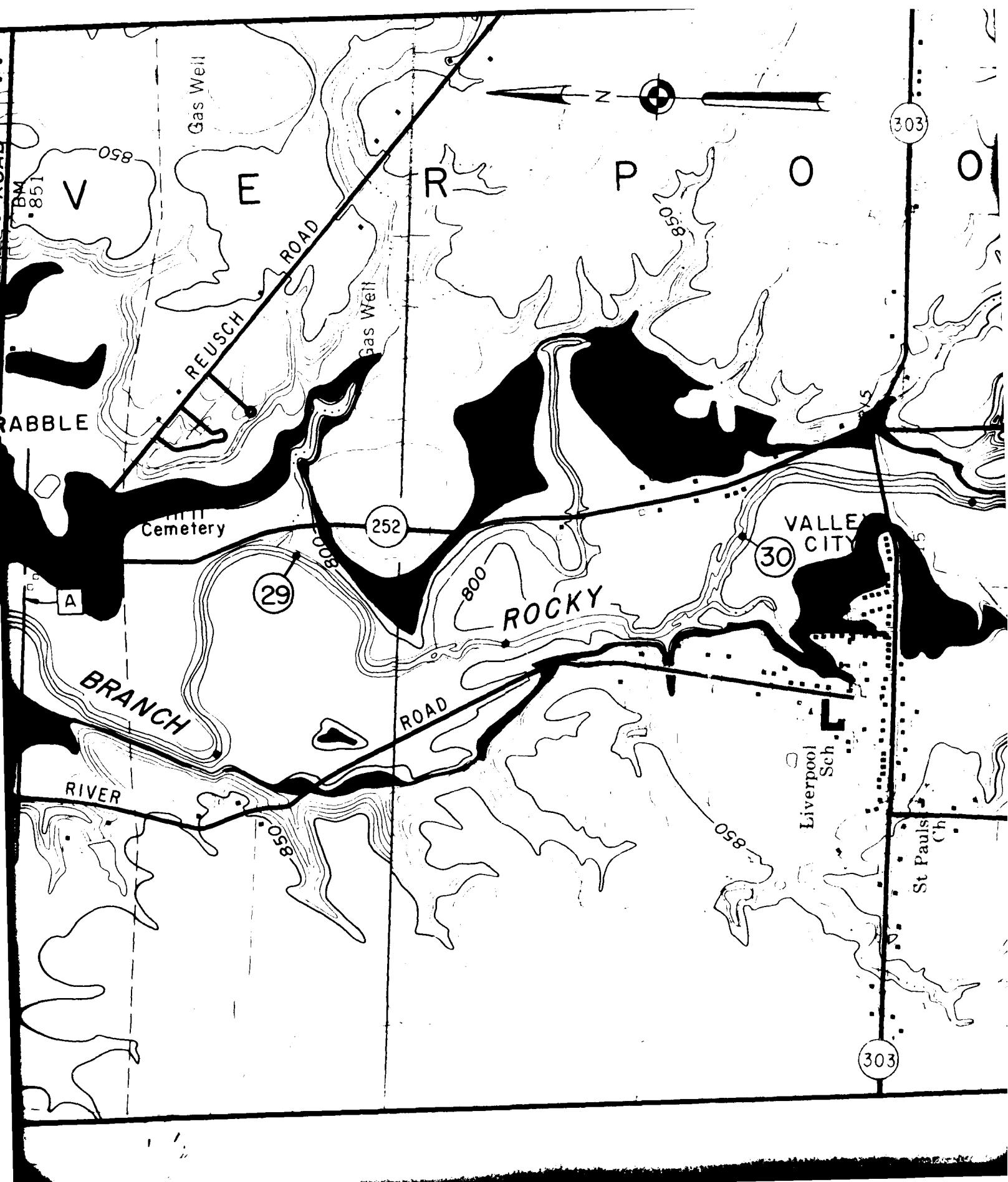
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MEDINA COUNTY
FLOOD PLAIN INFORMATION
INDEX FOR FLOODING
U.S. ARMY ENGINEER DEPT.
OCTOBER 1961

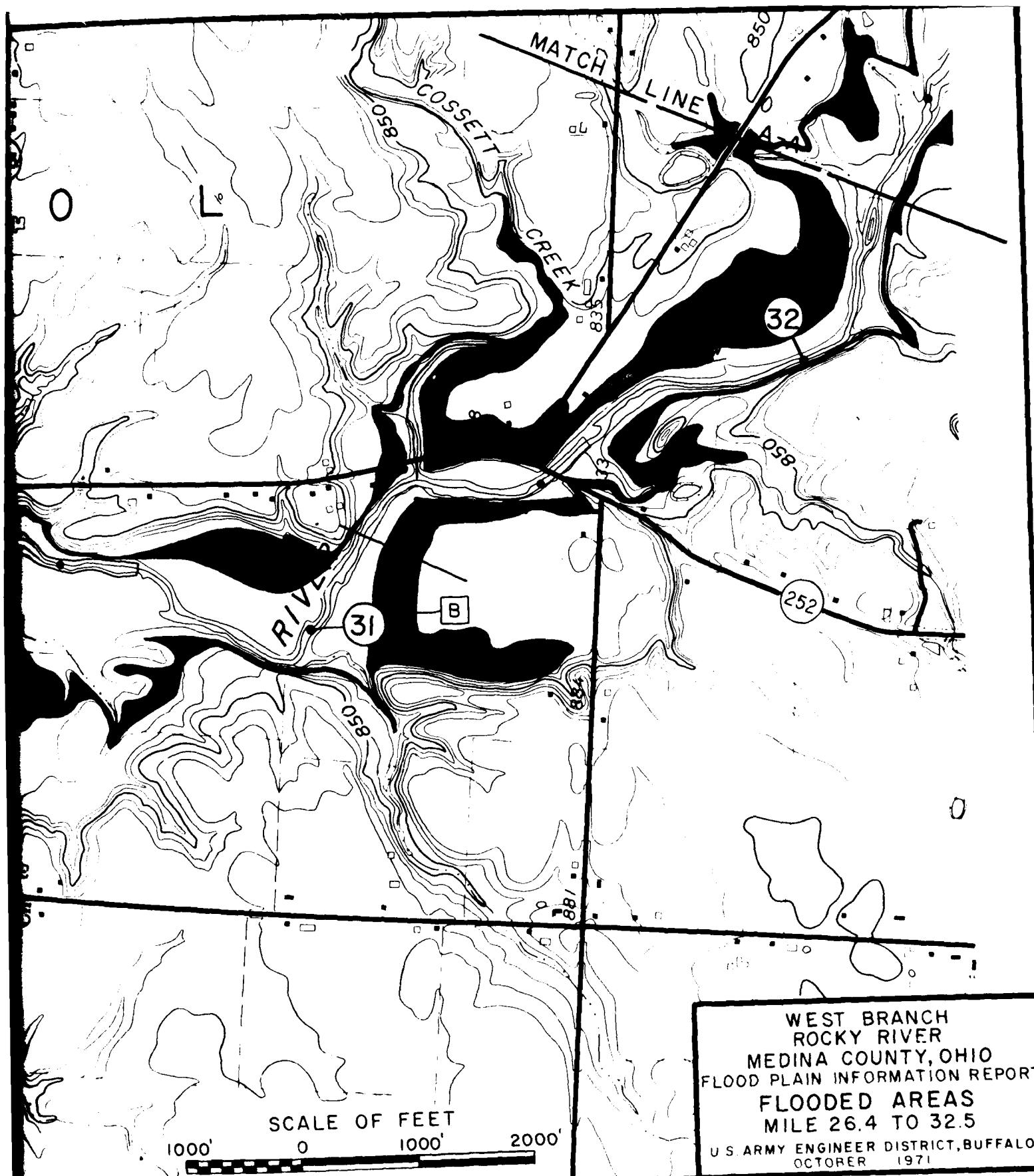


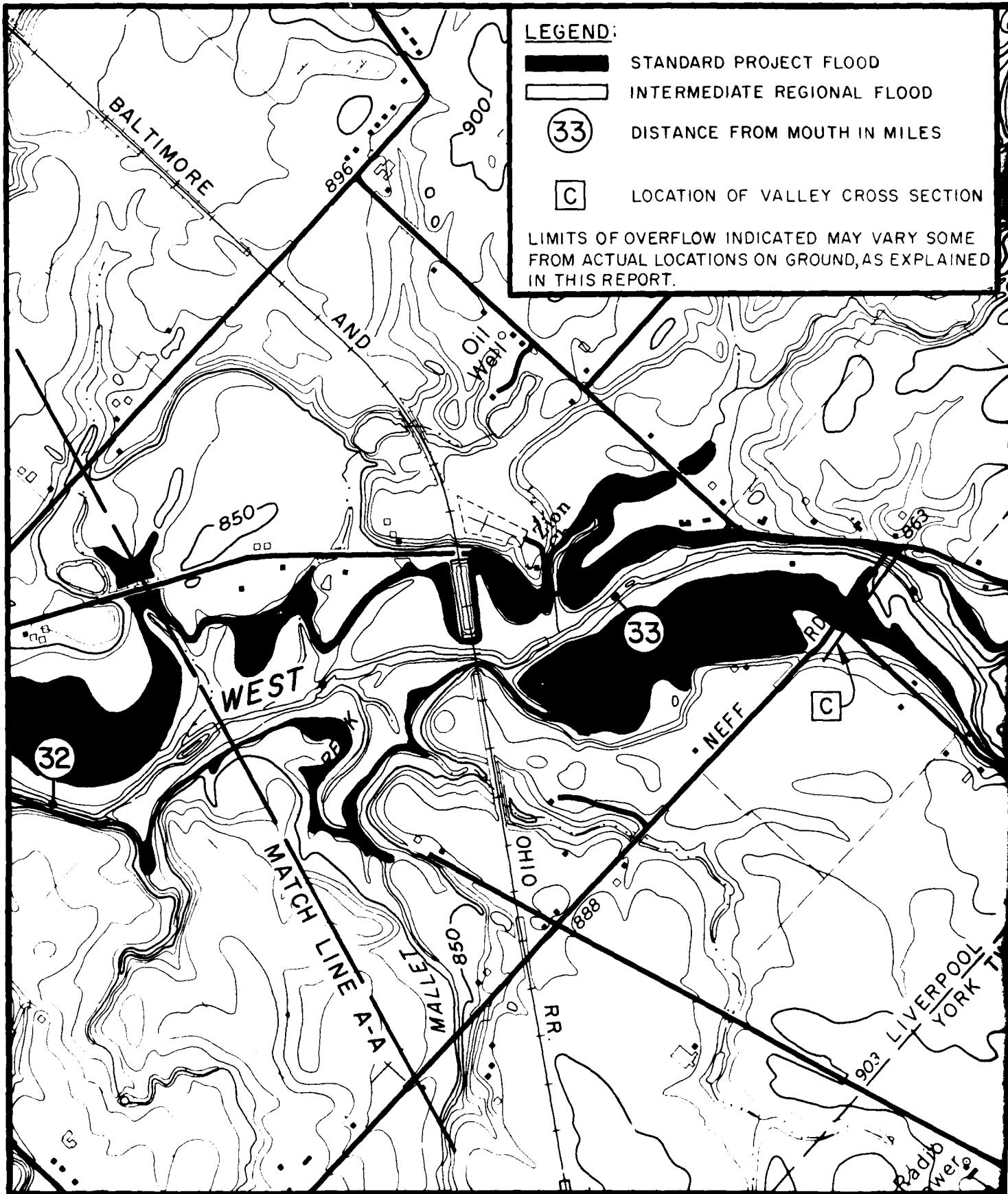
WEST AND NORTH BRANCH
ROCKY RIVER
MEDINA COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
INDEX MAP
FOR FLOODED AREAS
U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER 1971

PLATE 3



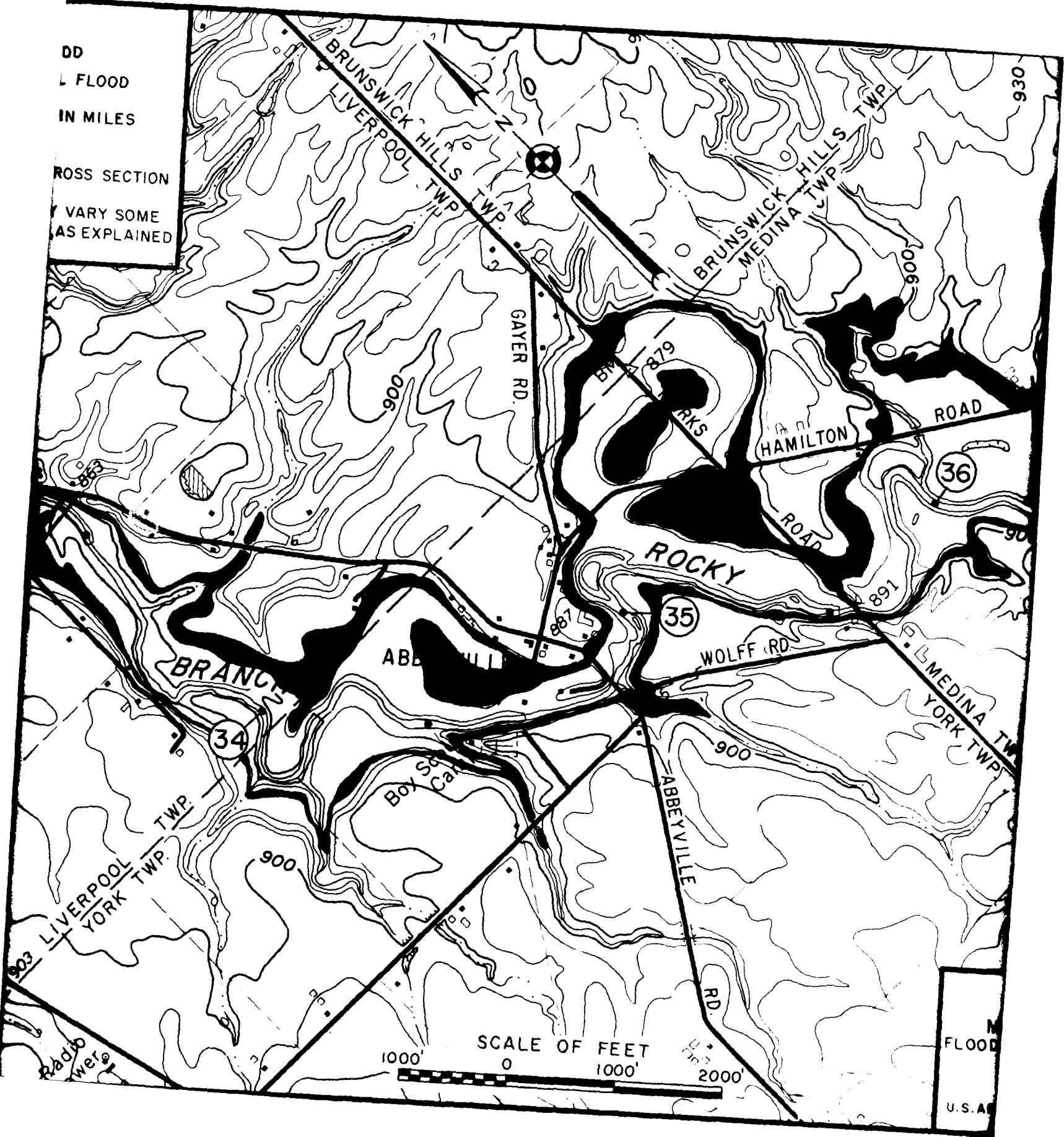






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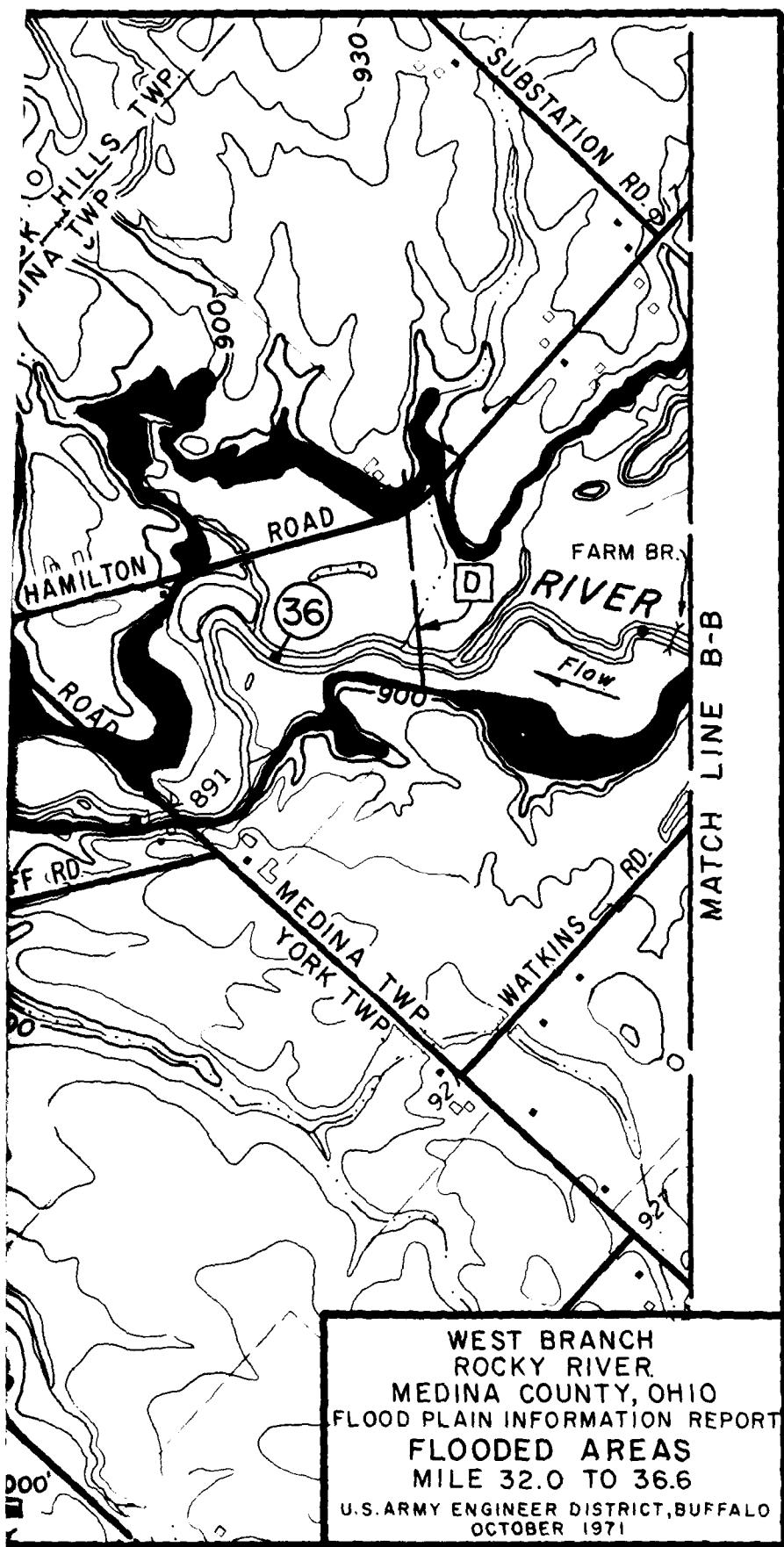
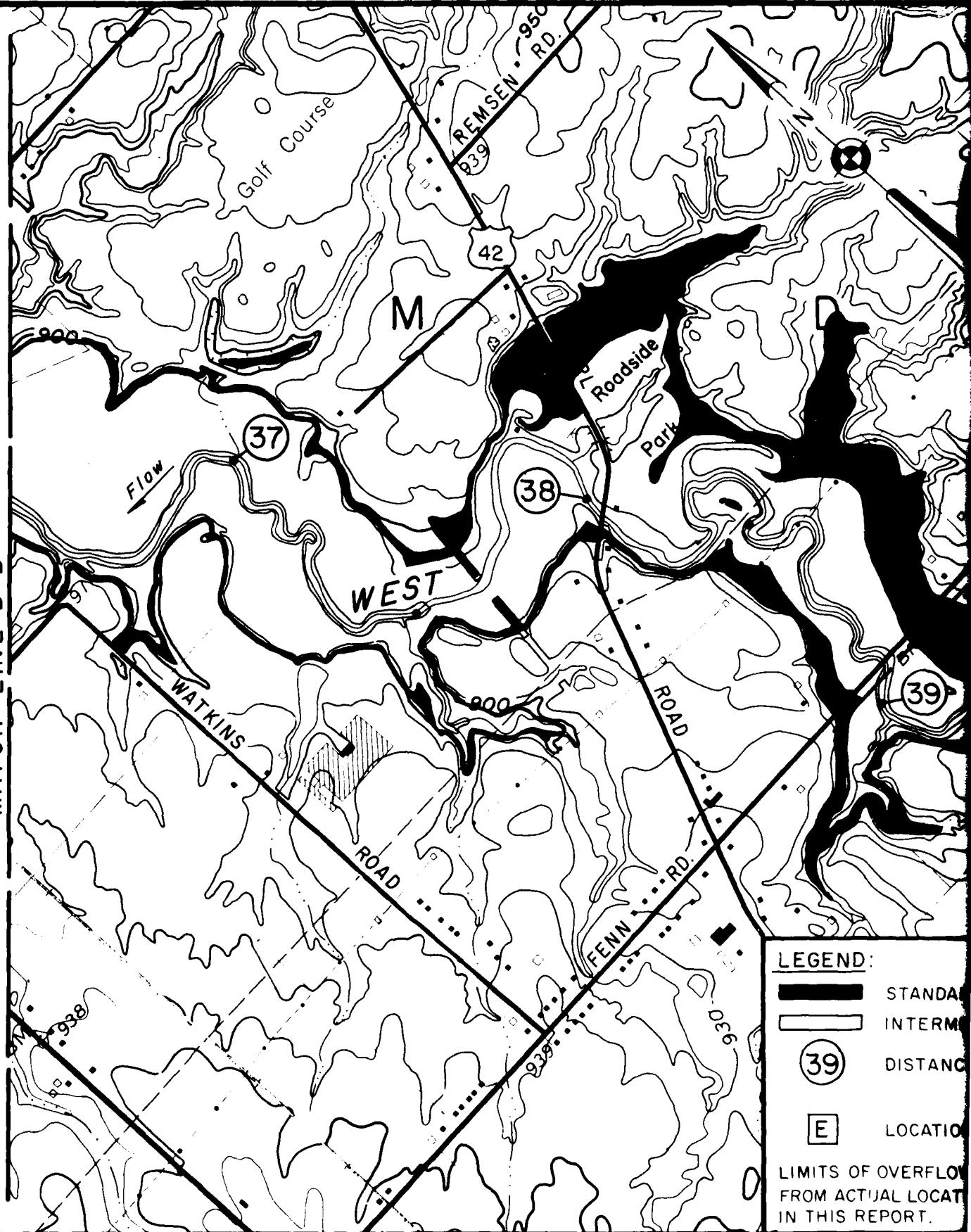


PLATE 5

MATCH LINE B-B



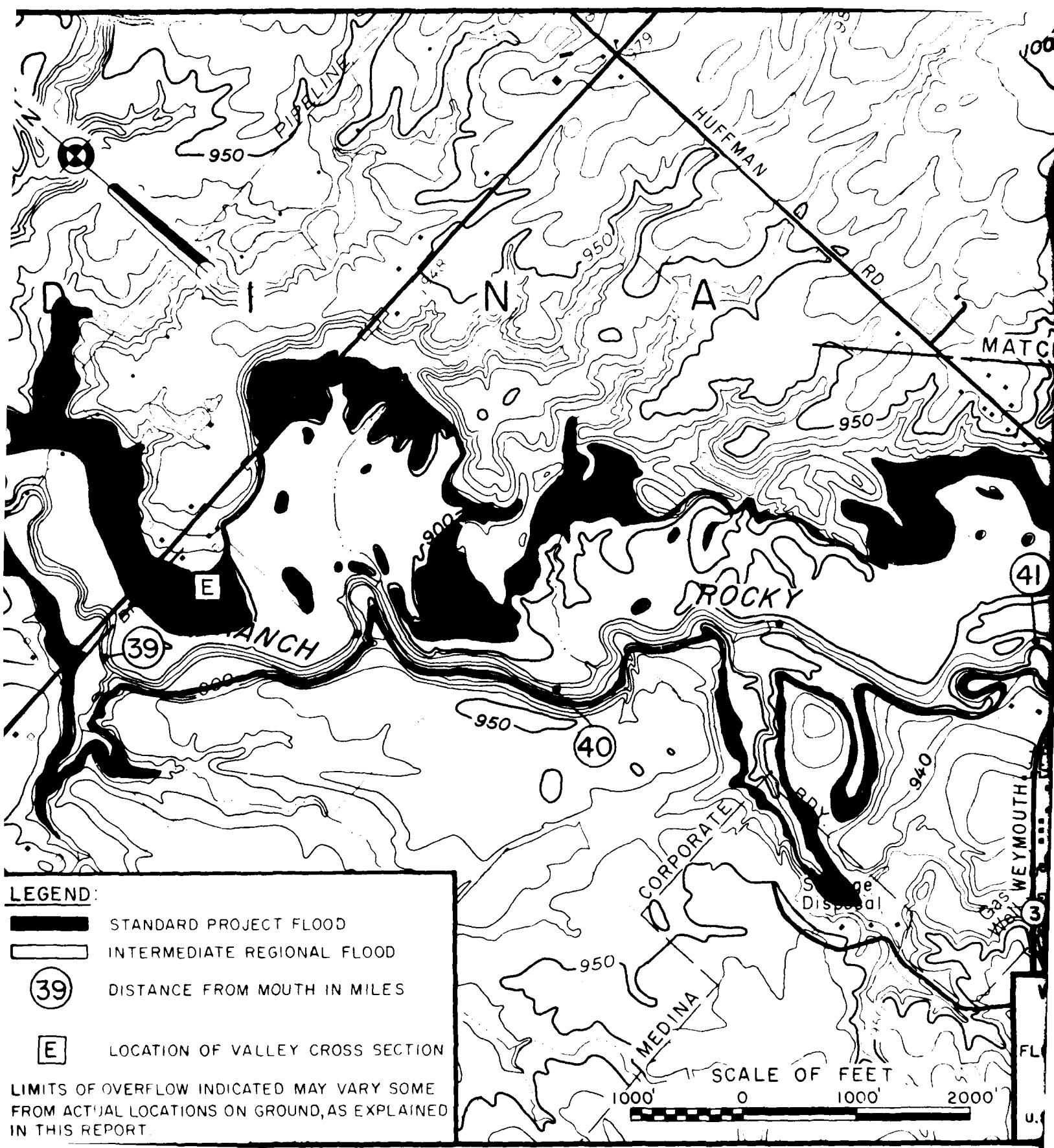
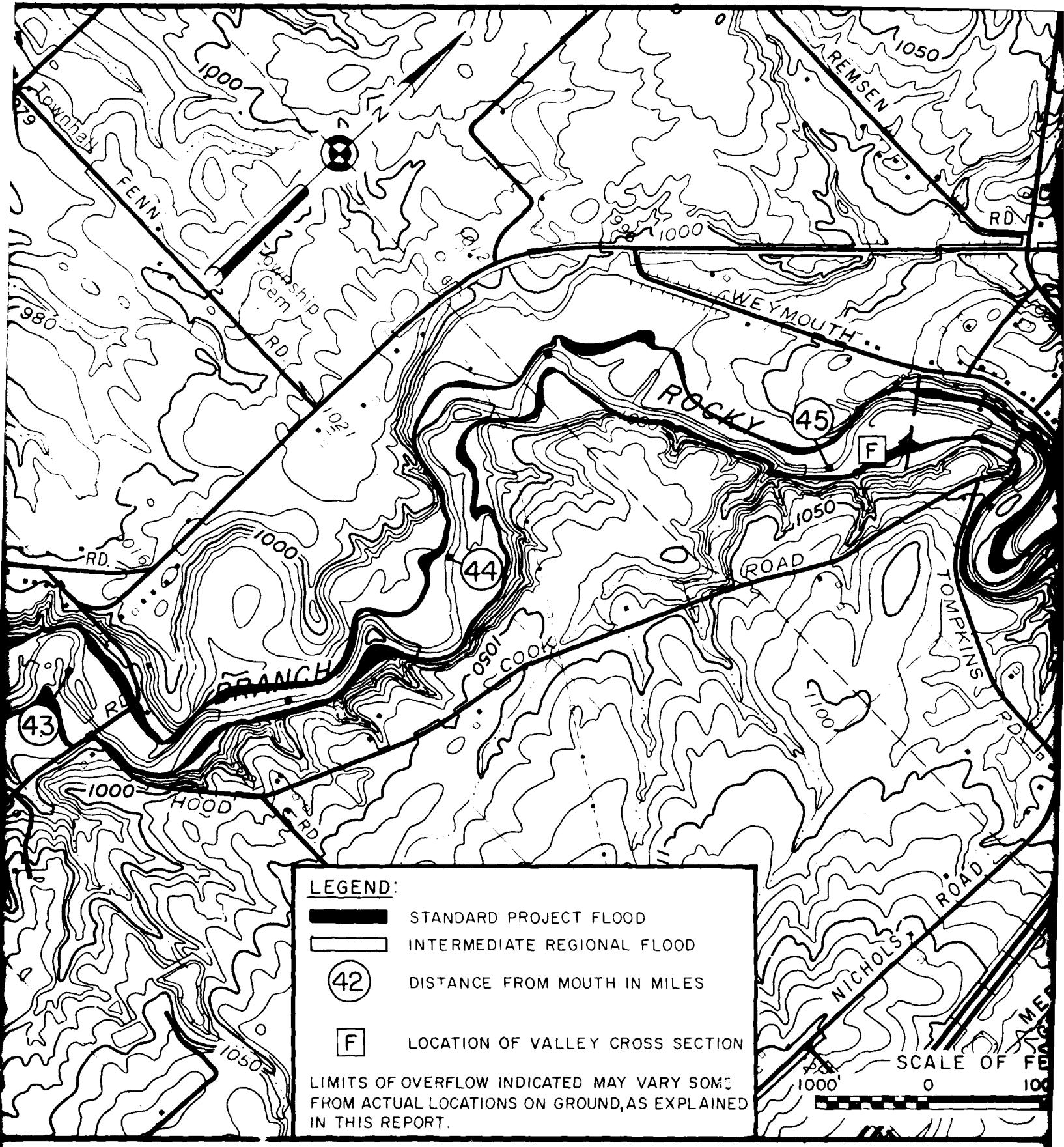
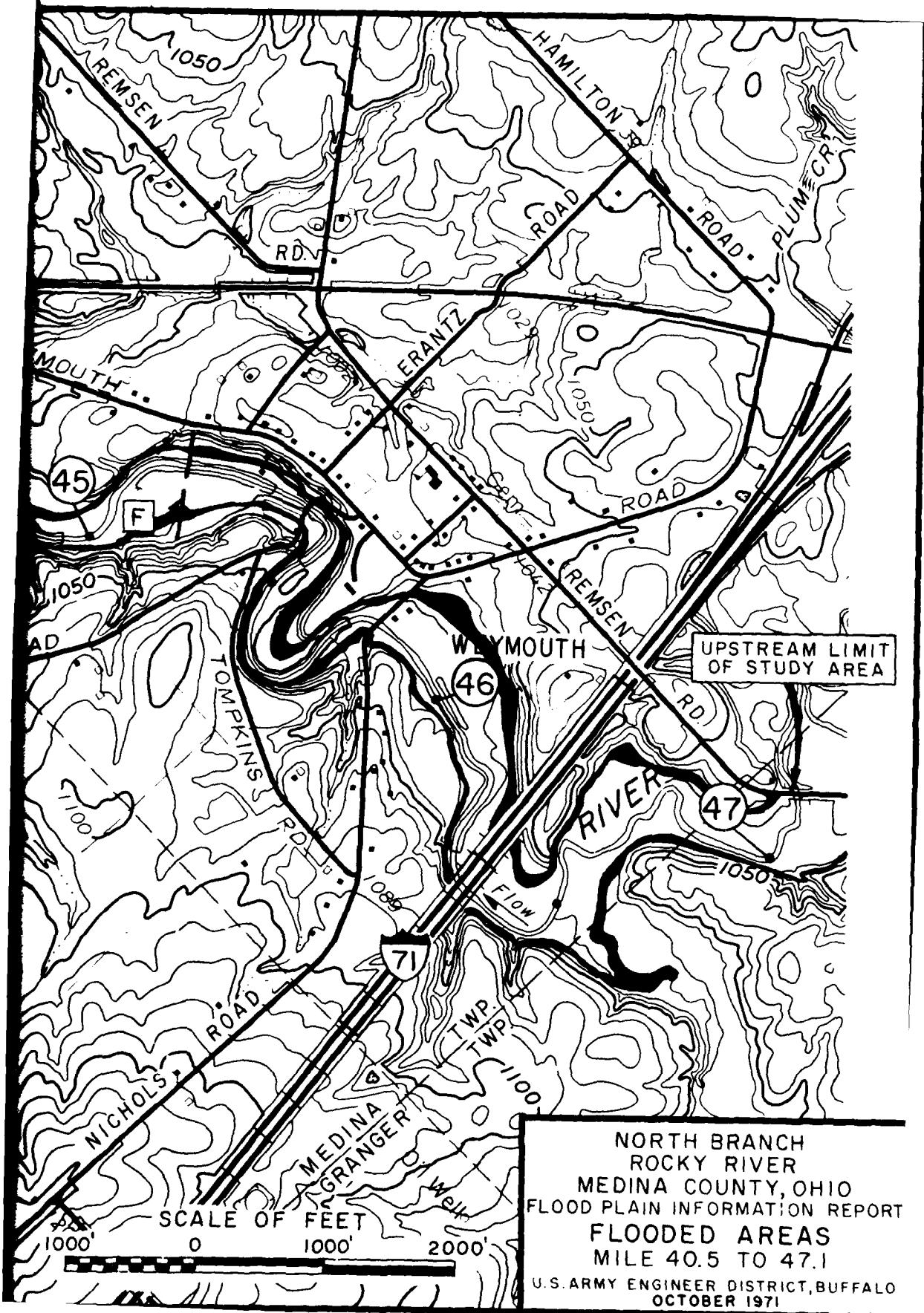


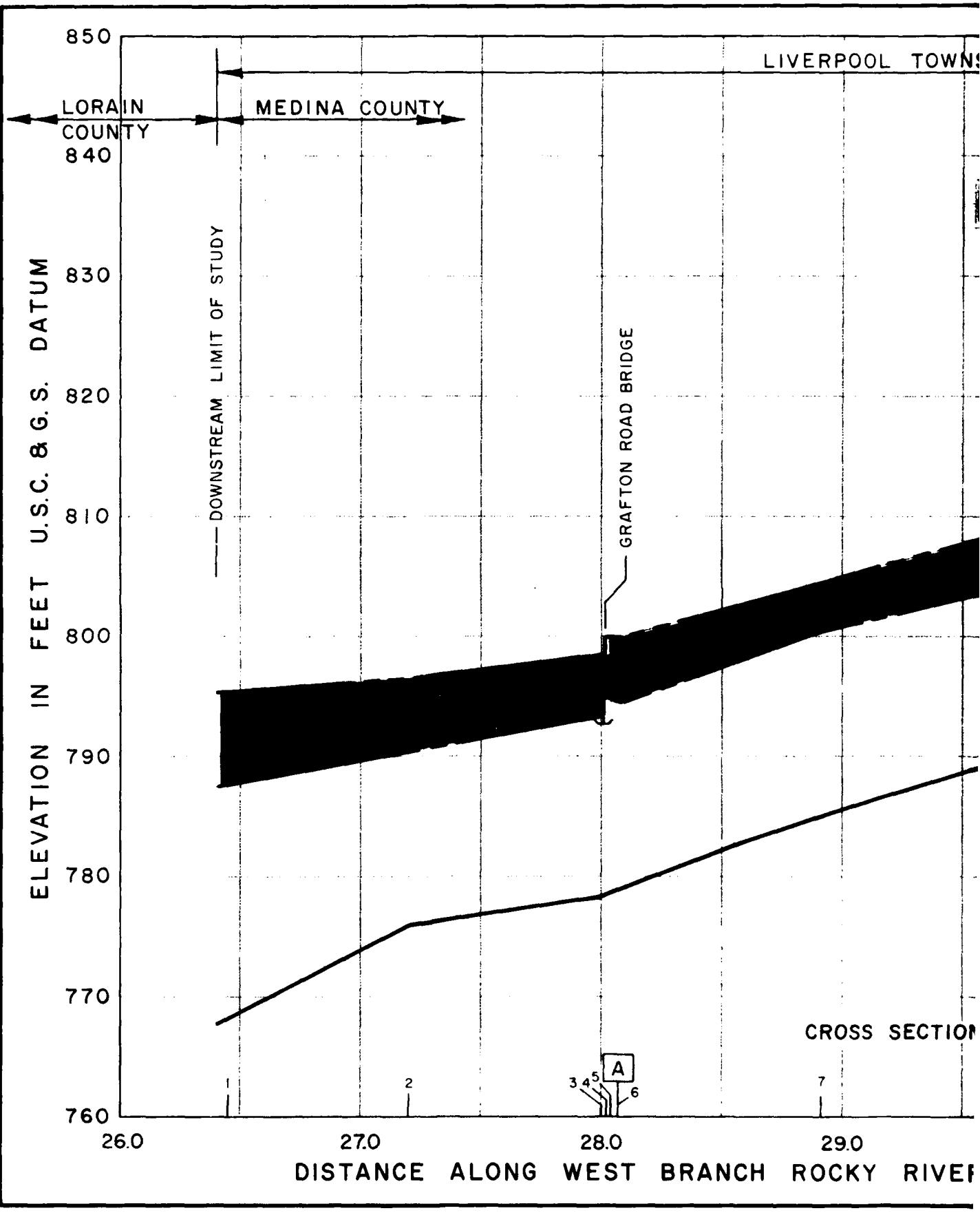


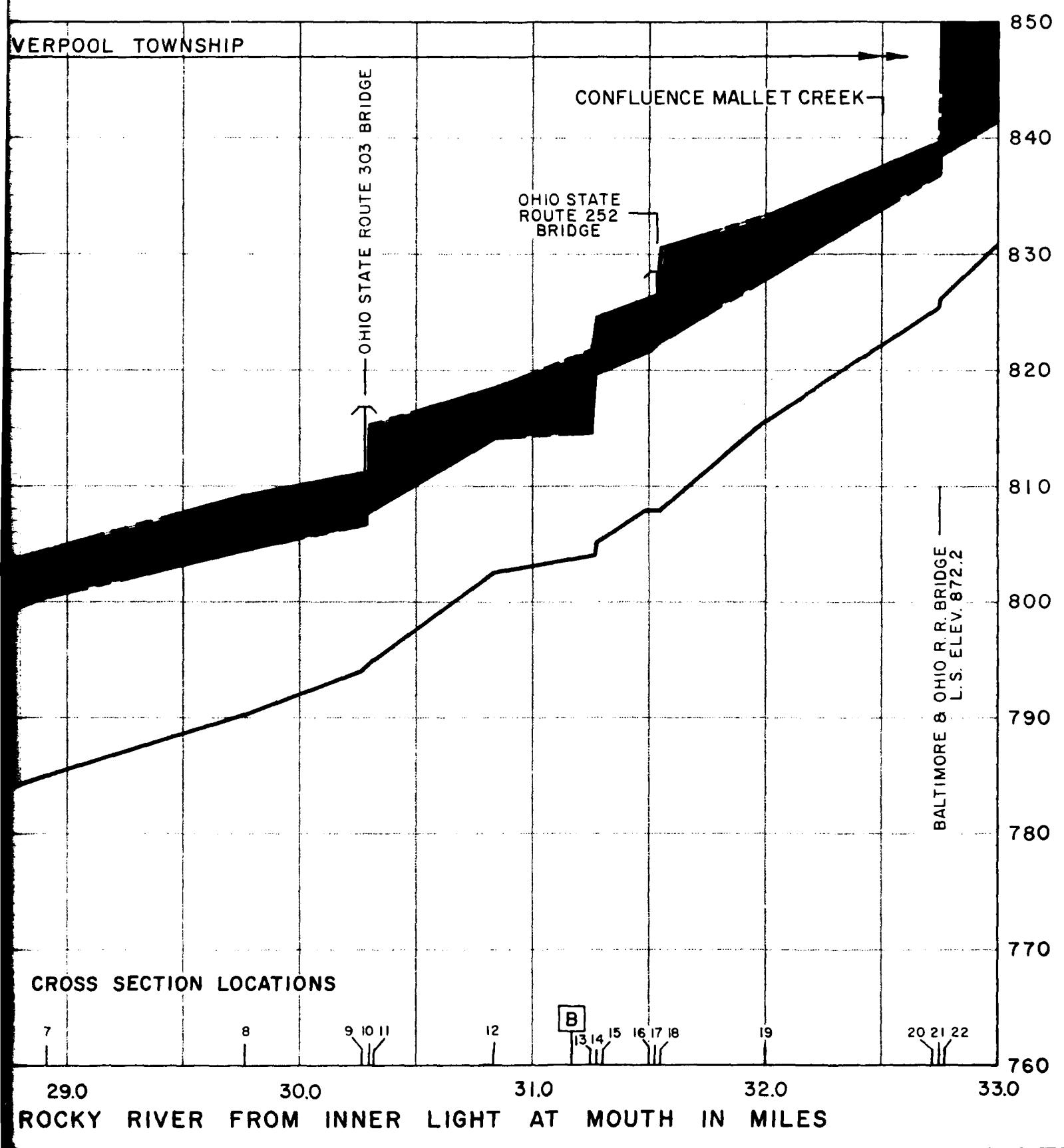
PLATE 6











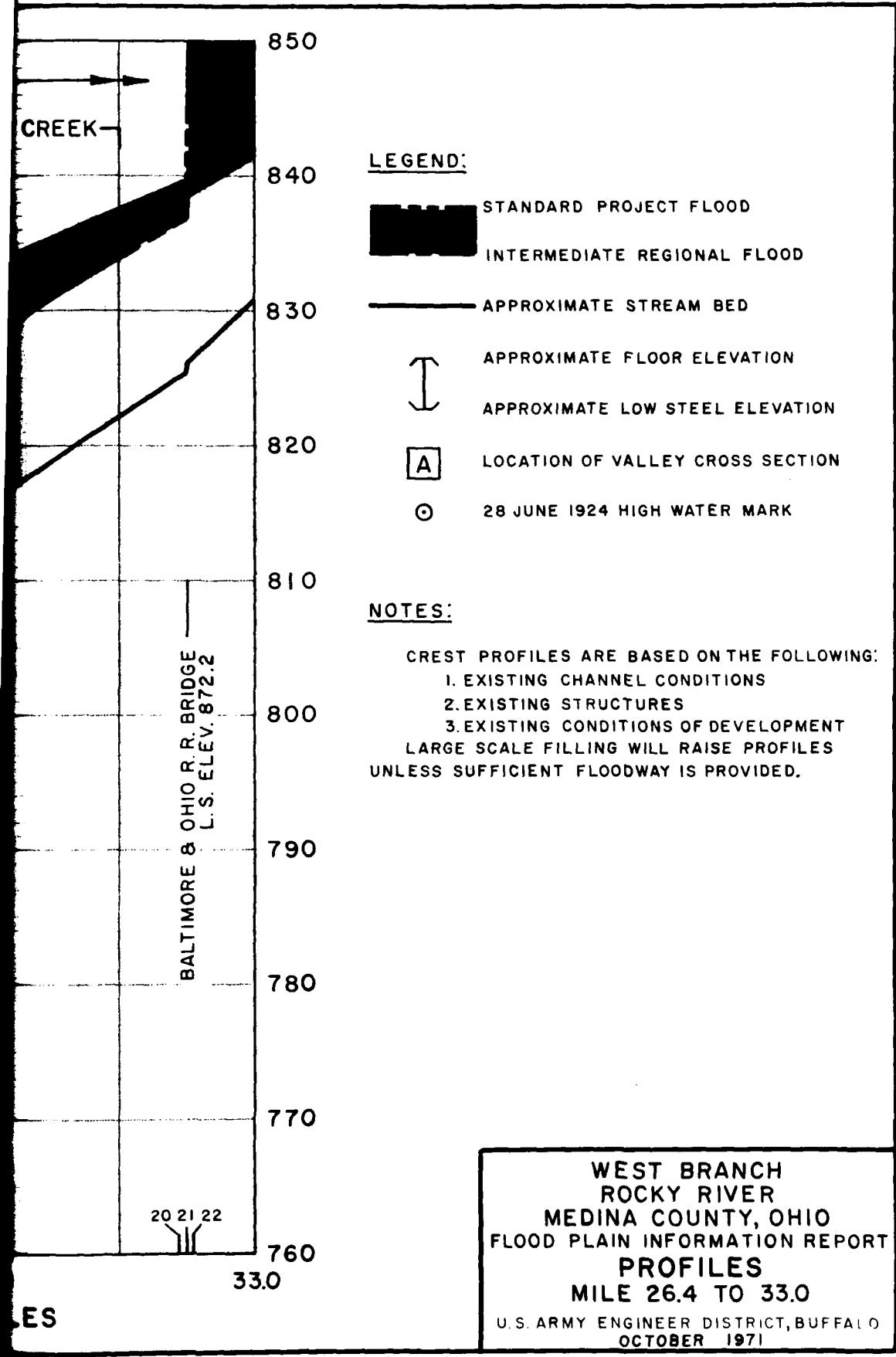
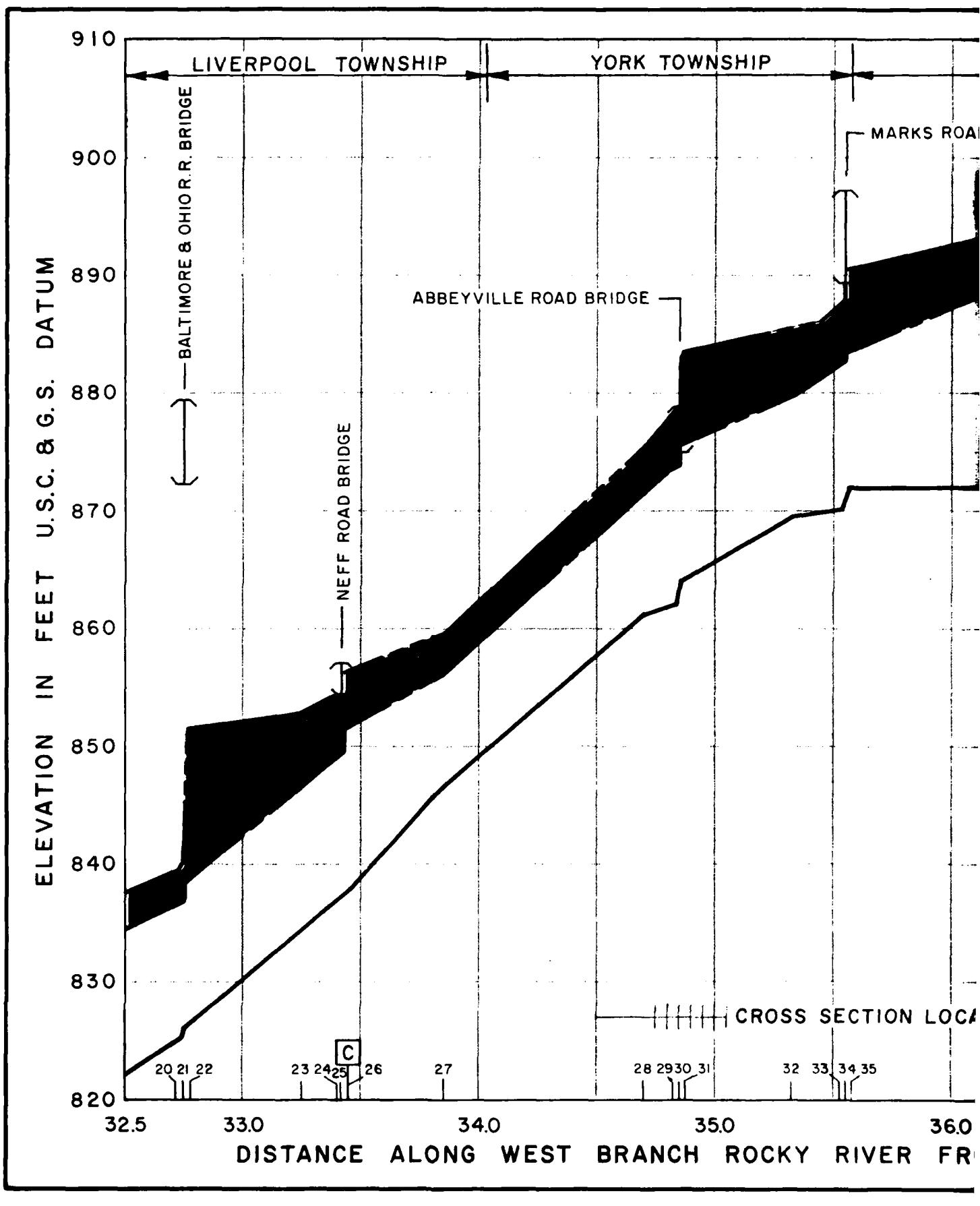
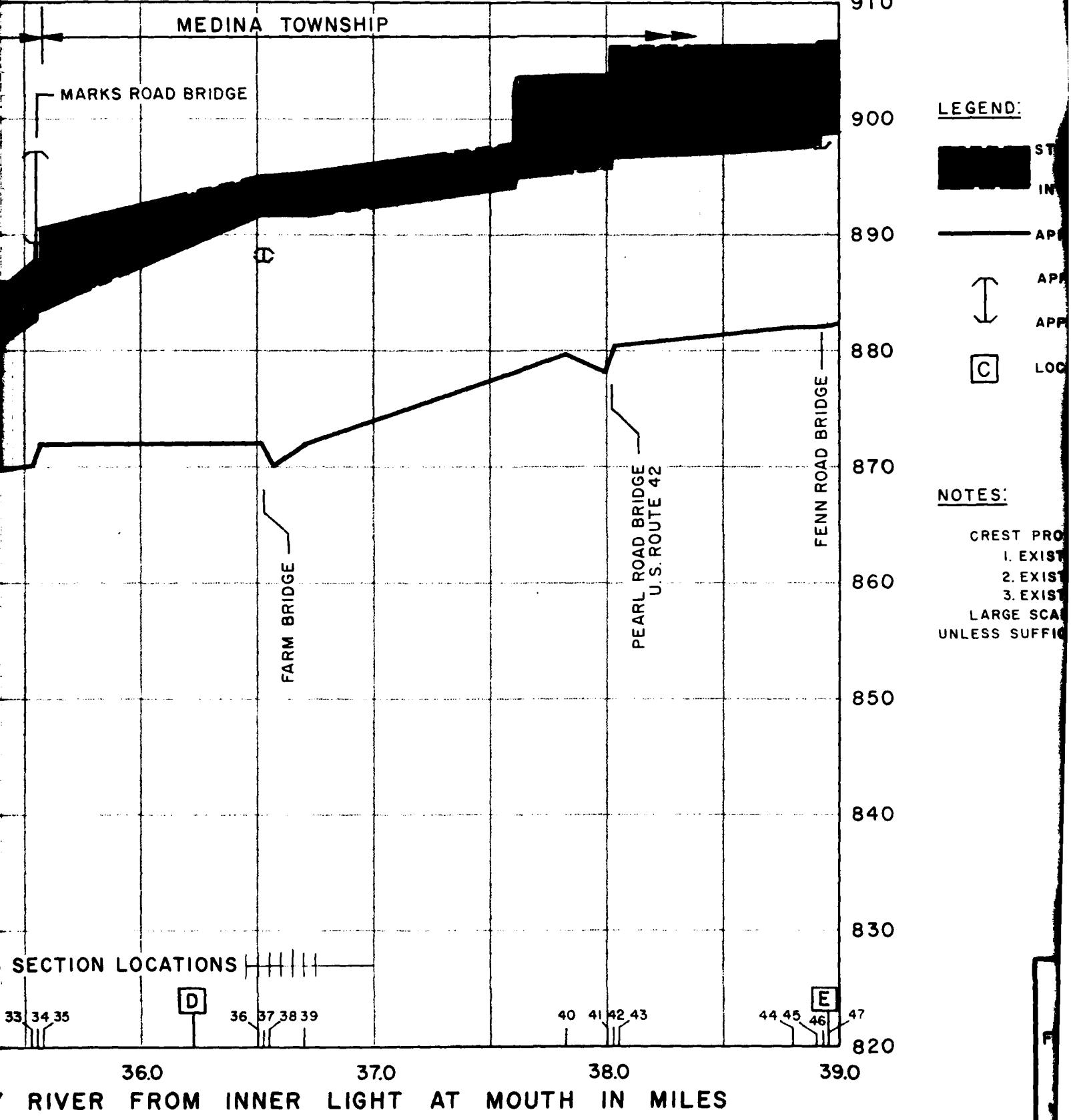


PLATE 8



MEDINA TOWNSHIP



910

LEGEND:

[Solid Box] STANDARD PROJECT FLOOD

[Solid Box] INTERMEDIATE REGIONAL FLOOD

890

— APPROXIMATE STREAM BED



APPROXIMATE FLOOR ELEVATION

↓ APPROXIMATE LOW STEEL ELEVATION



C LOCATION OF VALLEY CROSS SECTION

880

870

NOTES:

CREST PROFILES ARE BASED ON THE FOLLOWING:

1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

LARGE SCALE FILLING WILL RAISE PROFILES
UNLESS SUFFICIENT FLOODWAY IS PROVIDED.

850

840

830

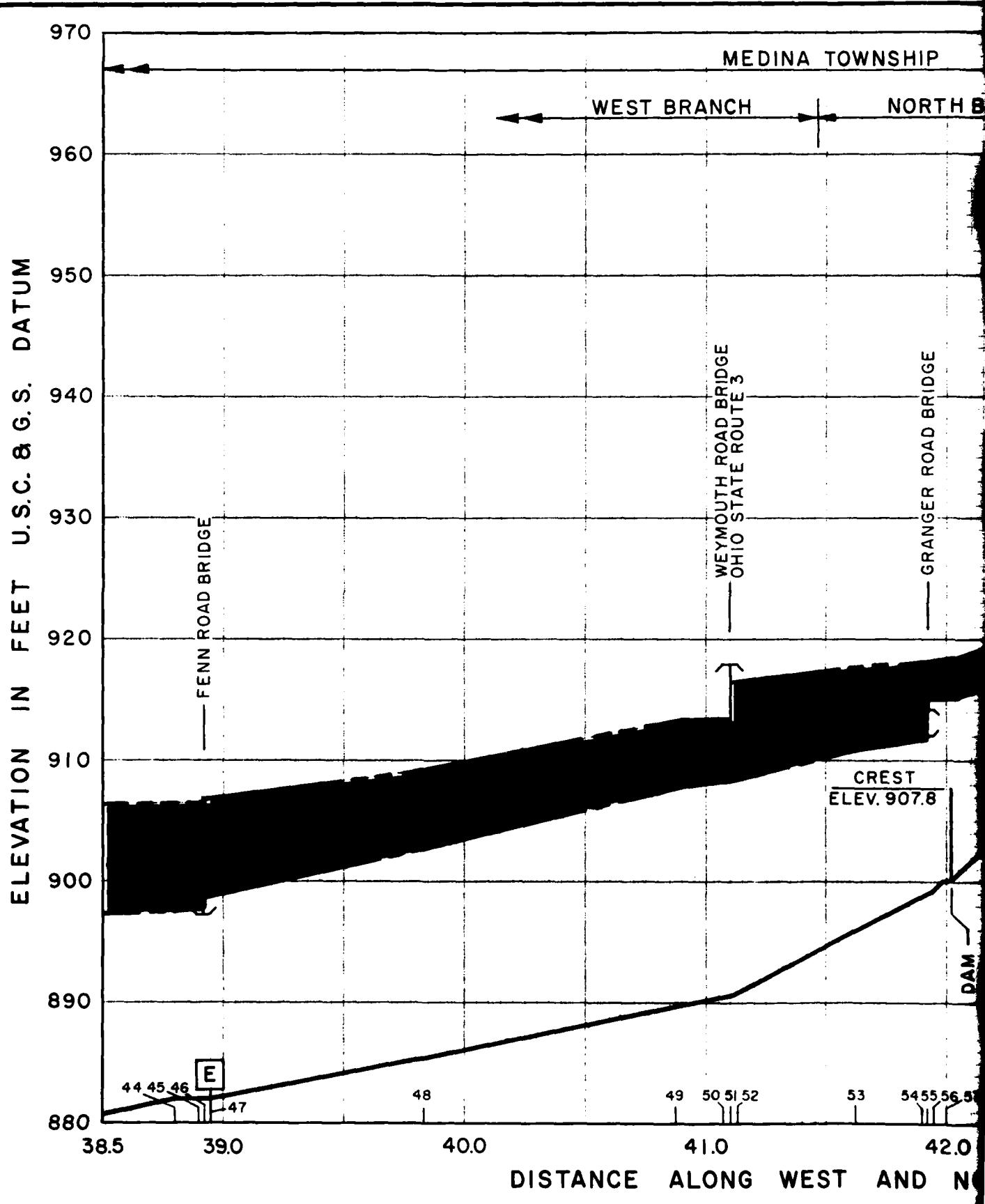
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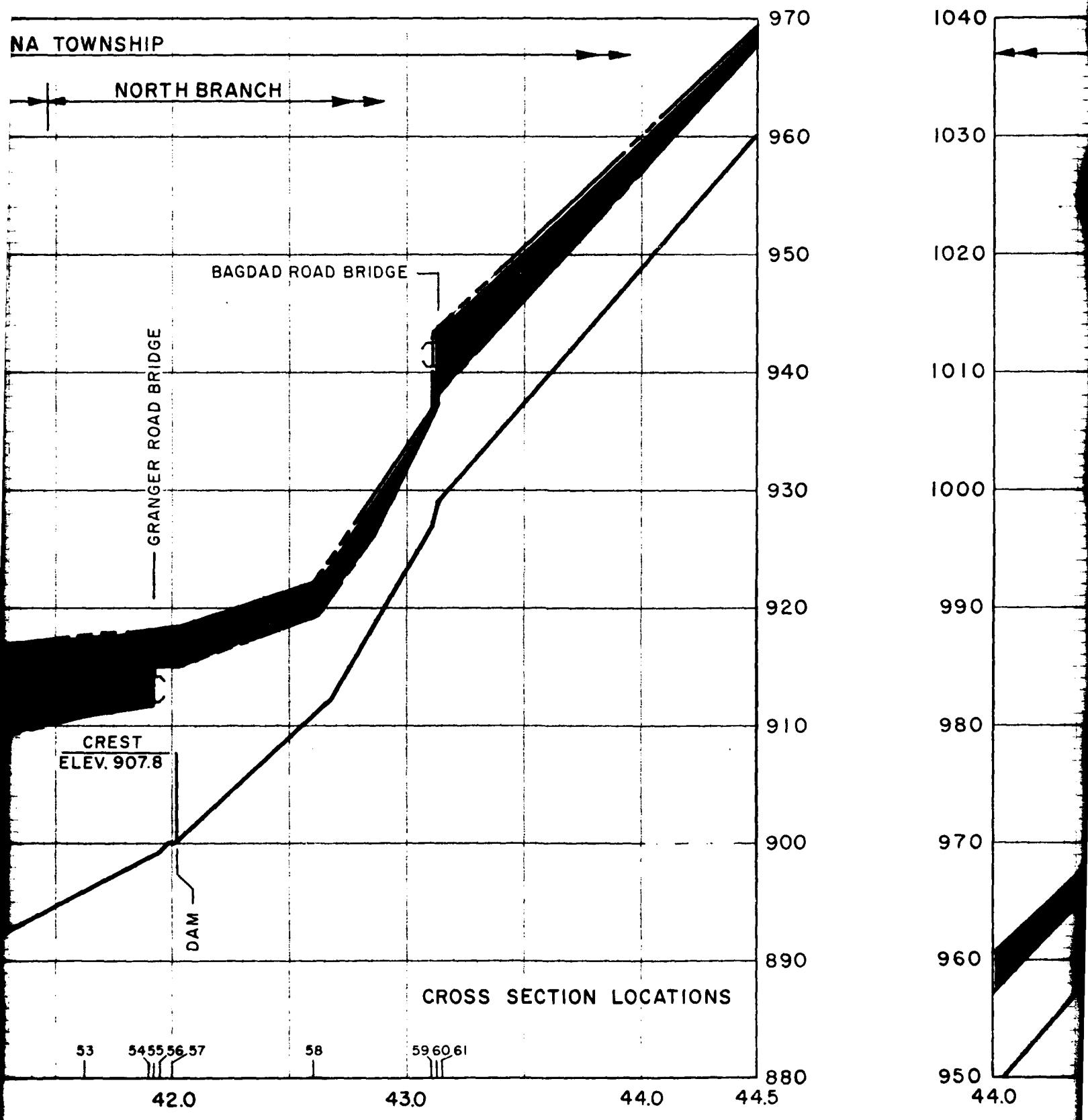
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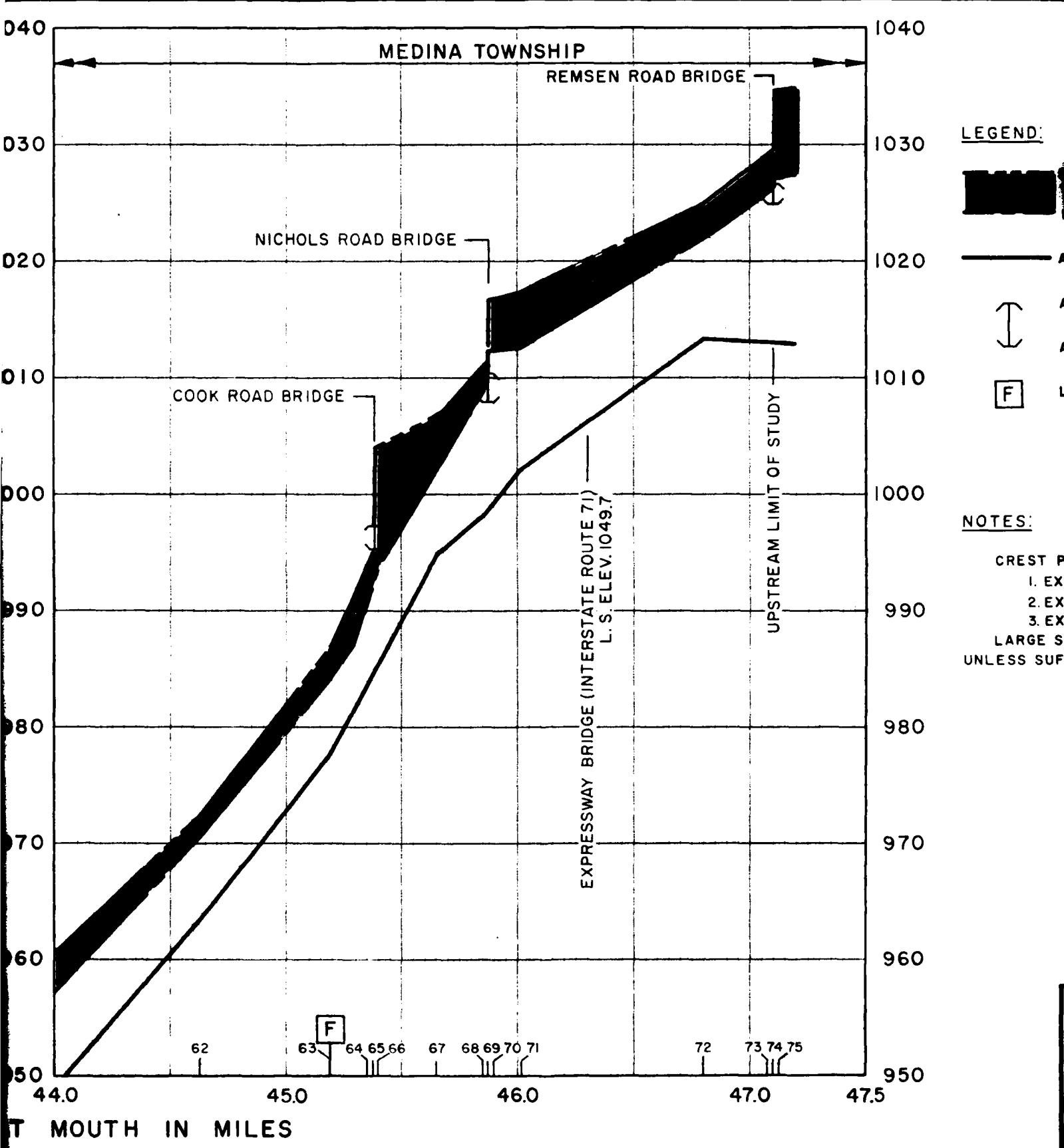
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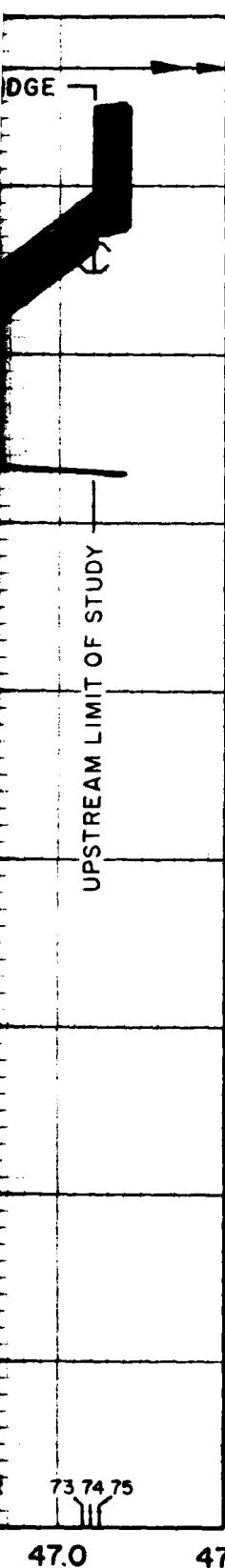
**WEST BRANCH
ROCKY RIVER
MEDINA COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
PROFILES
MILE 32.5 TO 39.0
U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER 1971**

PLATE 9









1040

1030

LEGEND:

[Solid black rectangle] STANDARD PROJECT FLOOD

[Hatched rectangle] INTERMEDIATE REGIONAL FLOOD

1020

— APPROXIMATE STREAM BED

|| APPROXIMATE FLOOR ELEVATION



|| APPROXIMATE LOW STEEL ELEVATION

1010



F LOCATION OF VALLEY CROSS SECTION

1000

NOTES:

CREST PROFILES ARE BASED ON THE FOLLOWING:

1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

LARGE SCALE FILLING WILL RAISE PROFILES
UNLESS SUFFICIENT FLOODWAY IS PROVIDED.

980

970

960

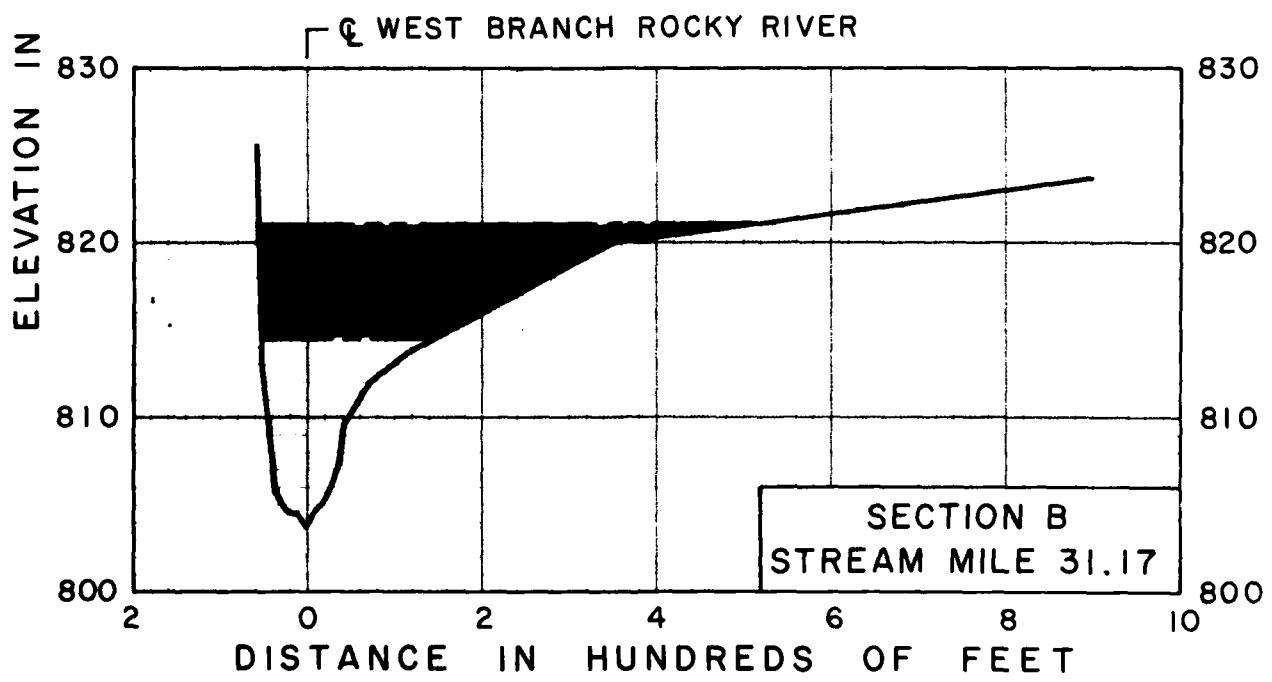
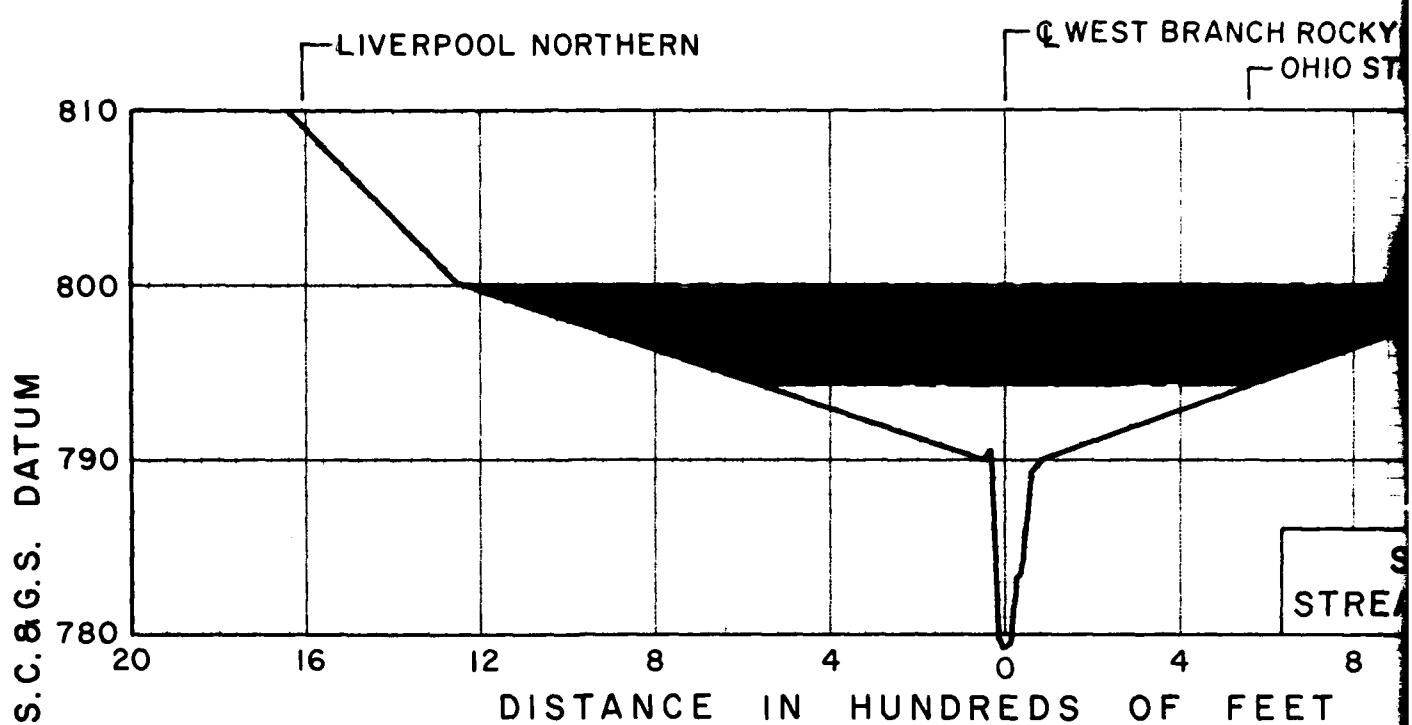
950

47.0

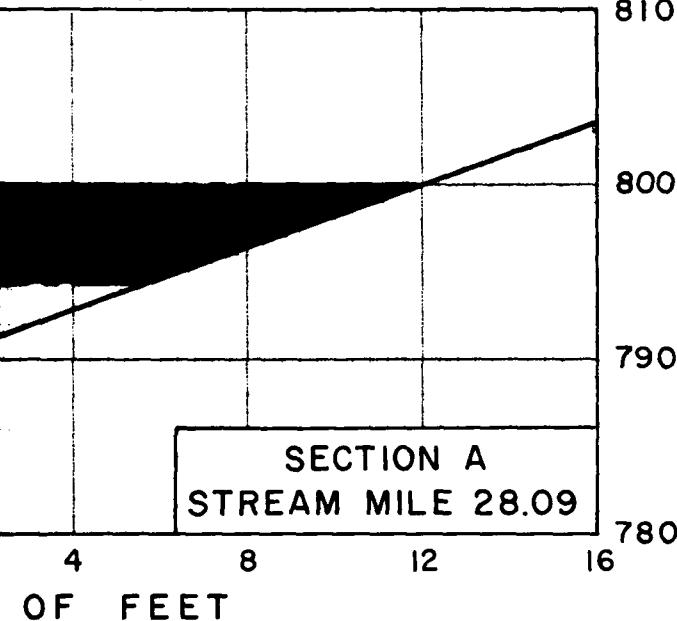
47.5

WEST AND NORTH BRANCH
ROCKY RIVER
MEDINA COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
PROFILES
MILE 38.5 TO 47.1
U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER 1971

PLATE 10



WEST BRANCH ROCKY RIVER
OHIO STATE ROUTE 252



OF FEET

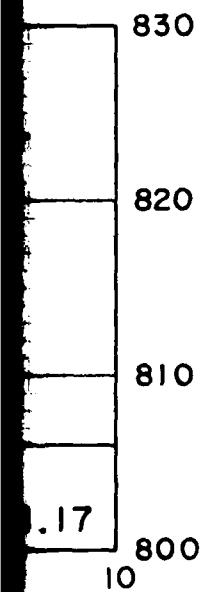
LEGEND:

- ██████████ STANDARD PROJECT FLOOD
- ██████████ INTERMEDIATE REGIONAL FLOOD
- APPROXIMATE GROUND SURFACE

NOTES:

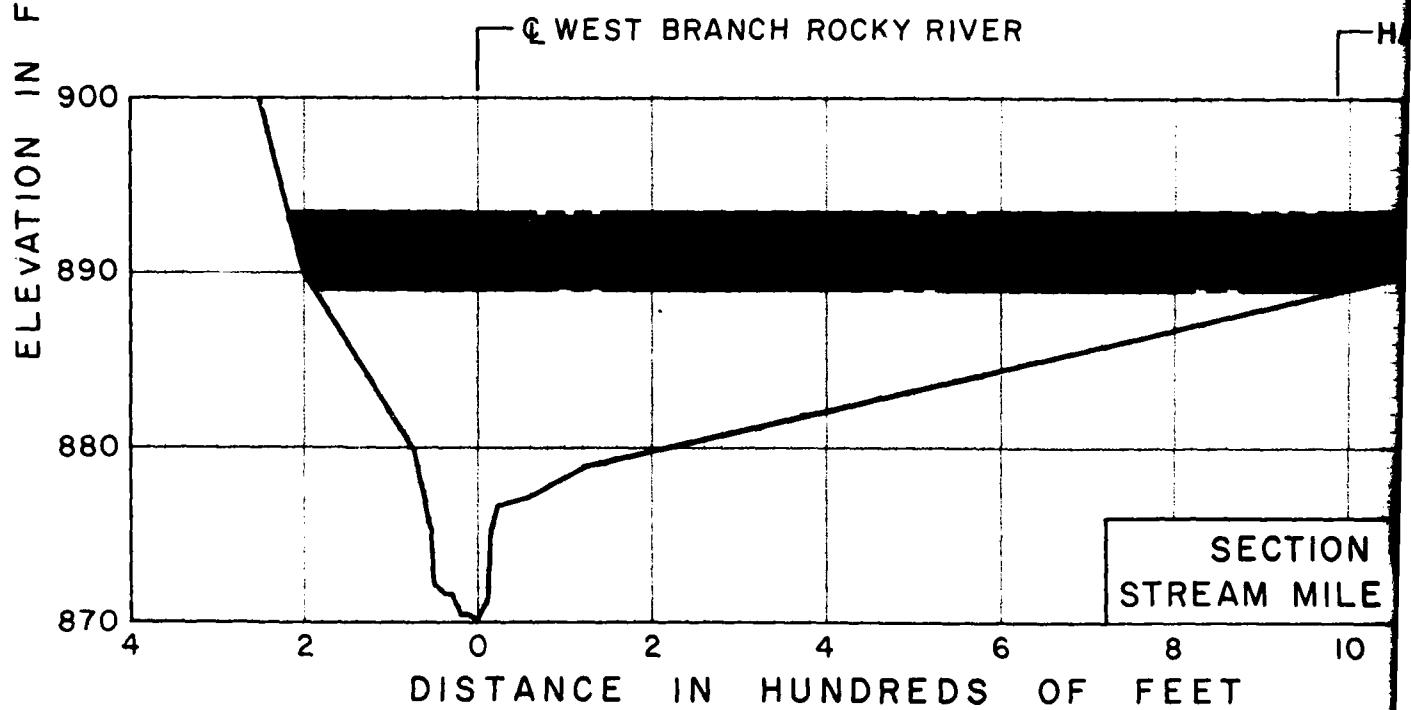
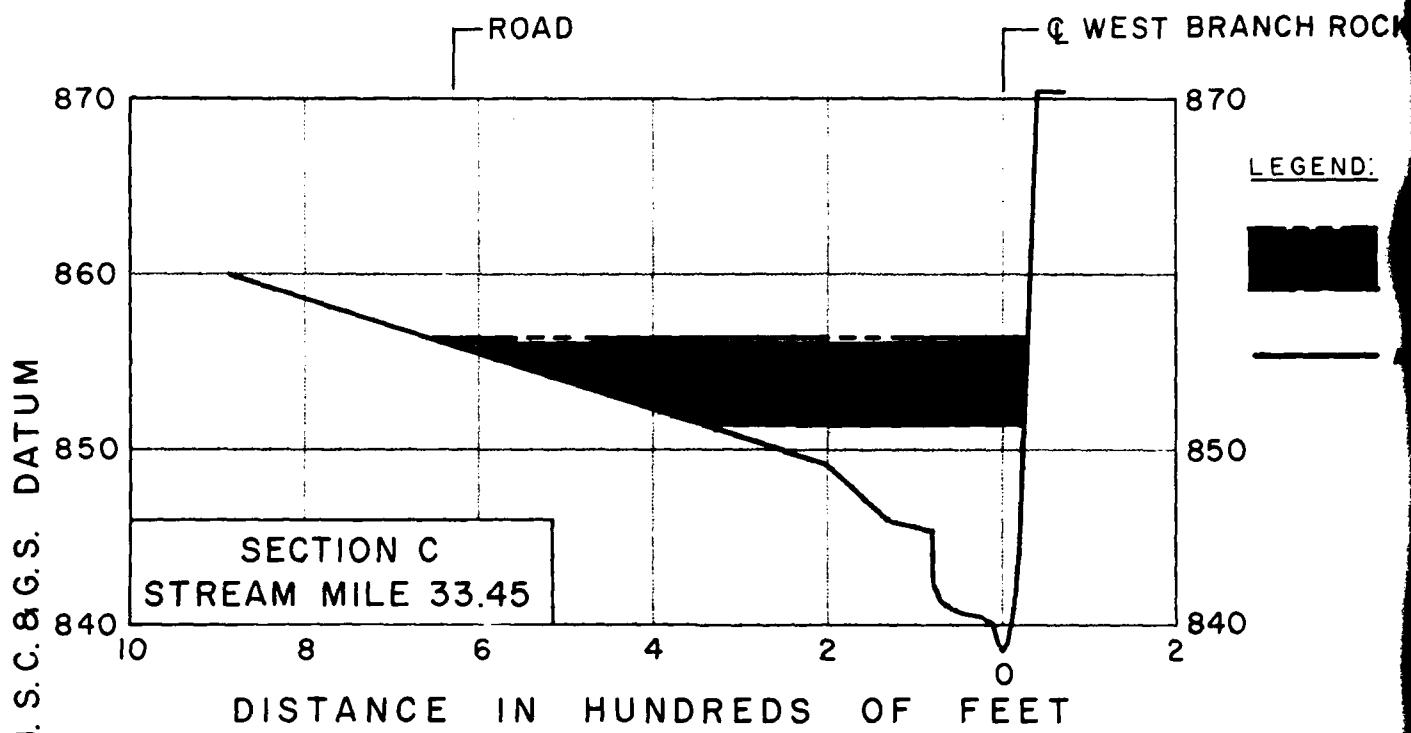
VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS, AND U.S. GEOLOGICAL QUADRANGLE MAPS.

VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATE 4.



WEST BRANCH
ROCKY RIVER
MEDINA COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
VALLEY CROSS SECTION
A AND B
U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER 1971

PLATE II



Q WEST BRANCH ROCKY RIVER

870

LEGEND:

[Solid Black Box] STANDARD PROJECT FLOOD

[Hatched Box] INTERMEDIATE REGIONAL FLOOD

— APPROXIMATE GROUND SURFACE

850

2
840

NOTES:

VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS, AND U.S. GEOLOGICAL QUADRANGLE MAPS.

VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATE 5.

ET

HAMILTON ROAD

900

890

880

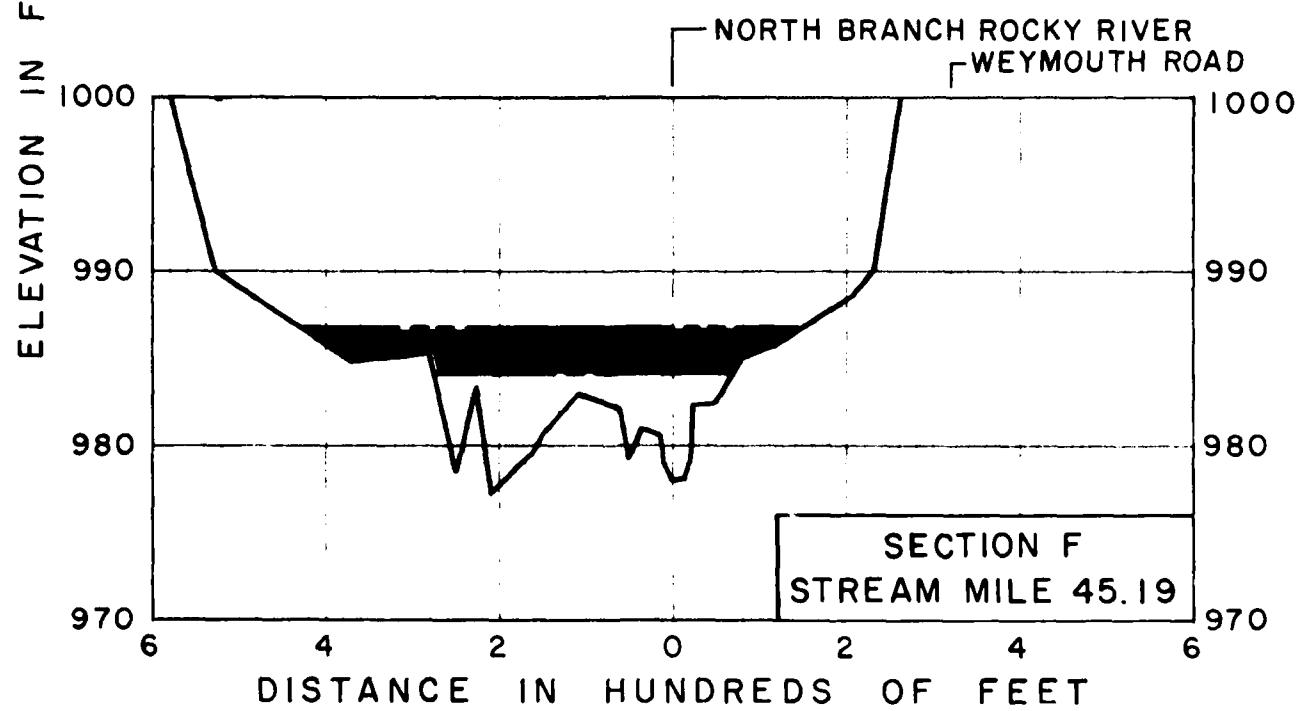
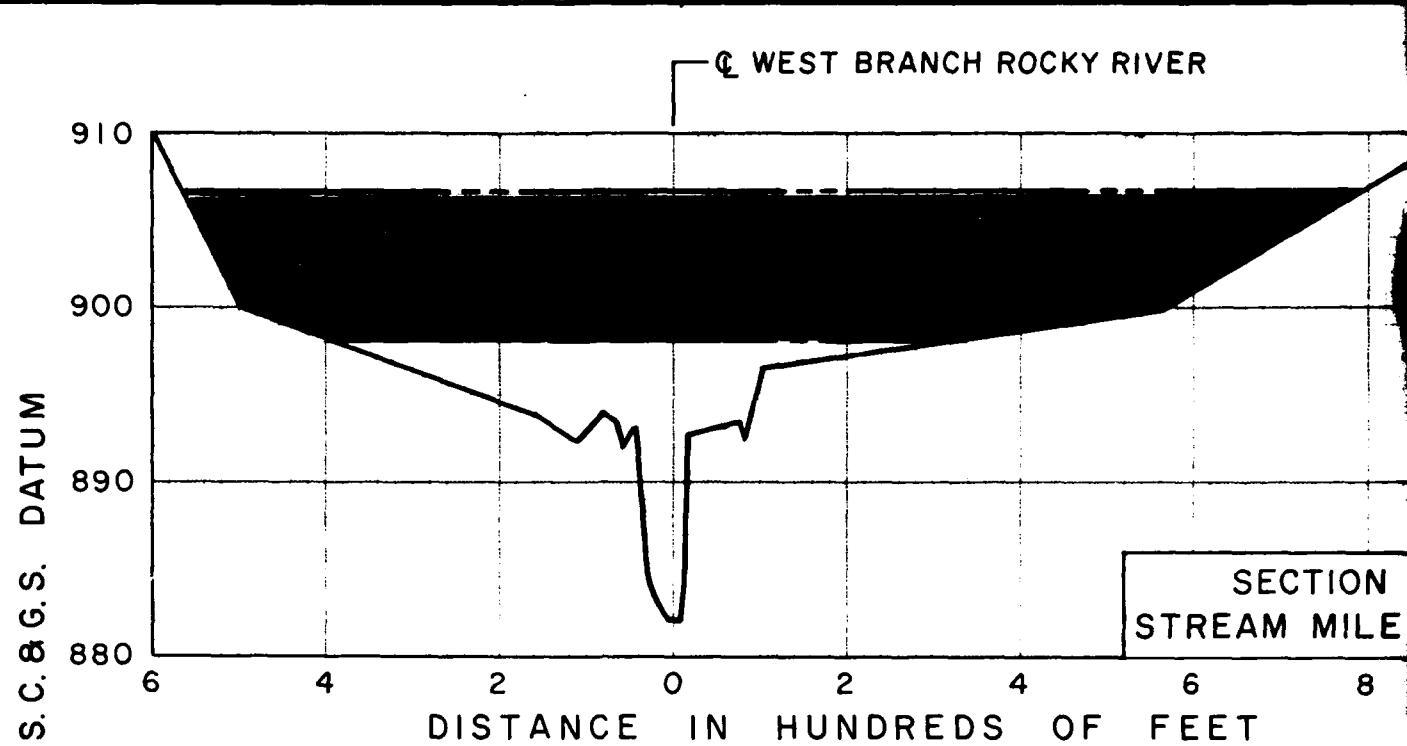
SECTION D
STREAM MILE 36.22

8 10 12

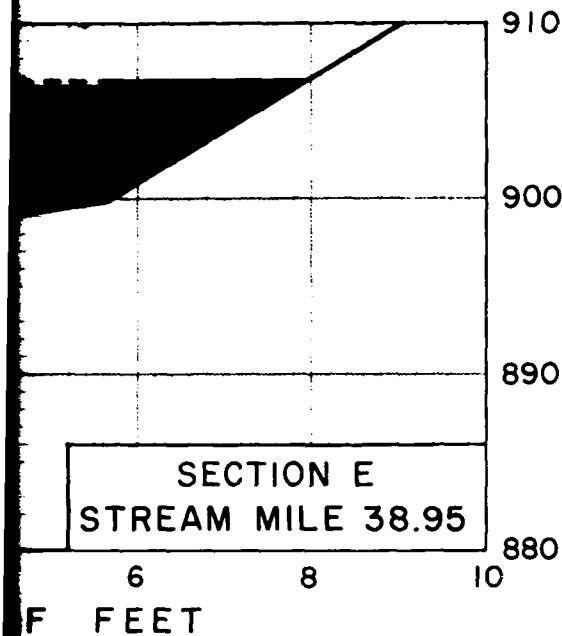
OF FEET

WEST BRANCH
ROCKY RIVER
MEDINA COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
VALLEY CROSS SECTION
C AND D
U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER 1971

PLATE 12



RIVER



LEGEND:

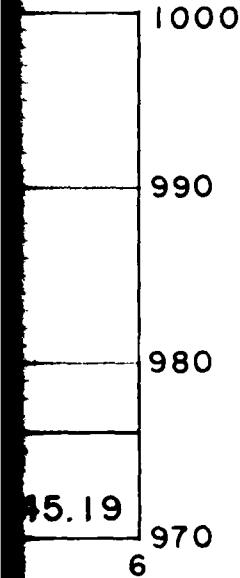
- STANDARD PROJECT FLOOD
- INTERMEDIATE REGIONAL FLOOD
- APPROXIMATE GROUND SURFACE

NOTES:

VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS, AND U.S. GEOLOGICAL QUADRANGLE MAPS.

VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATES 6 AND 7

RIVER
OUTH ROAD



WEST AND NORTH BRANCH
ROCKY RIVER
MEDINA COUNTY, OHIO
FLOOD PLAIN INFORMATION REPORT
VALLEY CROSS SECTION
E AND F

U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER 1971

PLATE 13

**DATE
ILMED
-8**